Traffic Engineering

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Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

COVER: Left turn channelization on S. W. Barbur Blvd., Portland, Oregon, at signalized intersection with Third and Miles Streets.

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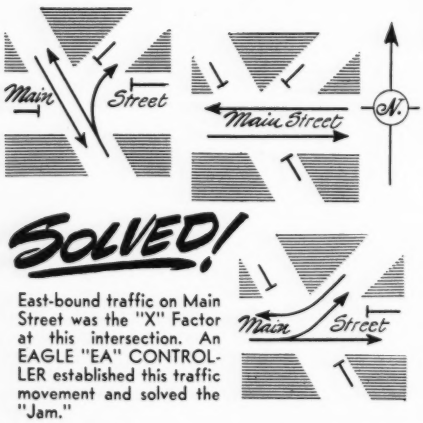

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LETTERS TO THE EDITORS

SOME SUGGESTIONS

The new "Traffic Engineering" magazine is something that we can be proud of. You all certainly merit a great deal of praise for getting out such an attractive and interesting publication. I can truthfully say that I always drop whatever is at hand to peruse the magazine when it arrives at my desk.

Since you have requested constructive suggestions for possible modifications in the magazine, I am happy to comply with your request. The following points are not too serious but do concern, I believe, improvements which would help some to make the magazine a little more attractive and informative.

First of all, there are too many different styles of type face used. This is particularly noticeable on the title page. I think you should standardize on about three or four type faces.

You might try running some of the illustrations clear to the edge of the page to give variation as the "Civil Engineering" magazine does.

You should have a simple uniform system of headings and side headings for the four types of treatment. I would suggest sticking to one type size and face for each of these four:

1. Feature article (author)
2. Short article (author)
3. Short news item (no author)
4. Feature (reference notes, letters to editors, etc.)

More use should be made of small size type in the text of articles both to save space and provide a little variation.

Under "discussion" the side heading should be smaller than the major heading and the author's name should go at the head, I should think.

Under "reference notes" it would make for easier reading if the subject or title were included as a heading.

I don't see any need for including the major heading "Other Traffic News."

I trust the above will provide some food for thought. Again I say it is a fine magazine and I know it is going to be a bigger success with each succeeding issue.

HENRY K. EVANS
Hwy. Transp. Spec.
U. S. Chamber of Commerce
Washington, D. C.

● Subscribers will note that we have incorporated changes in style and format that essentially cover all of the excellent suggestions presented by Mr. Evans.—ED.

COVER PHOTOGRAPH

I am very much disturbed, if that is possible, by the cover carried by the January issue of "Traffic Engineering" magazine. On this cover is shown a small town, which you can practically see through, having small directional signs installed on an extended arm post, which would probably cost $150.00 to install. The elaborate support for two small directional signs certainly seems like throwing money down a sewer, when there are so many places that have practically no signing. On an installation of this type, I think that the signs would justify more elaborate treatment.

I would certainly have used a picture in a much larger town, where a costly installation would be more economically justified.

Since a lot of people now see this magazine, which I think is a great improvement over the former issues, wouldn't they think this is what the traffic engineer advocated? I know in my case, where my superiors are very lenient and cooperative in everything I suggest, I would hesitate to recommend the expenditure of money for an installation of this type, from the evidence shown in this picture.

LOU BENDER
Traffic Engineer
Port of New York Authority
New York City

We read with great interest Lou Bender's comments on the picture of overhead route markings in Michigan, which appear on the cover of the January issue of "Traffic Engineering" magazine.

First of all, the picture was taken at the crossing of two of the Nation's greatest highways as indicated by the route markers—that of US-10 from Detroit, Michigan, to Seattle, Washington, and US-27 from Mackinaw City, Michigan, to Miami, Florida.

By their very nature they are high volume routes from a great industrial city to the Pacific Coast and from the heart of summer vacation-land to the head of winter vacation-land. Therefore, signs at such an important intersection as this are only as serviceable to the public as the sign location and certainly from the motorist's operational standpoint, over-the-lane markings are more desirable.

True, the town looks small and it is small, but we feel that the size of the town in which a junction of two very important highways is located, is unimportant. The type of signing used in a case like this is not done for the local traffic, but for the large volume of through traffic which necessarily uses two highways of this type. Michigan has adopted a policy to install over-head directional signs at all of its major junctions, particularly in cities and towns and in a good many cases, at important rural junctions where there is a heavy vehicular turning movement.

We agree with Lou that it is not an inexpensive method of signing, but we also feel that the extra cost would be very incidental as compared with property damage that may arise from accidents which occur when motorists become confused in a turning movement. All locations in Michigan are signed according to their traffic needs and I do not know of any case where we have neglected to place signs because of large expenditures at these more important junctions. I believe the time is coming when traffic engineers will use more and more of this type of signing where traffic requirements demand it.

J. CARL McMONAGLE
Director
Planning & Traffic Div.
Michigan State Highway Department
Lansing, Michigan

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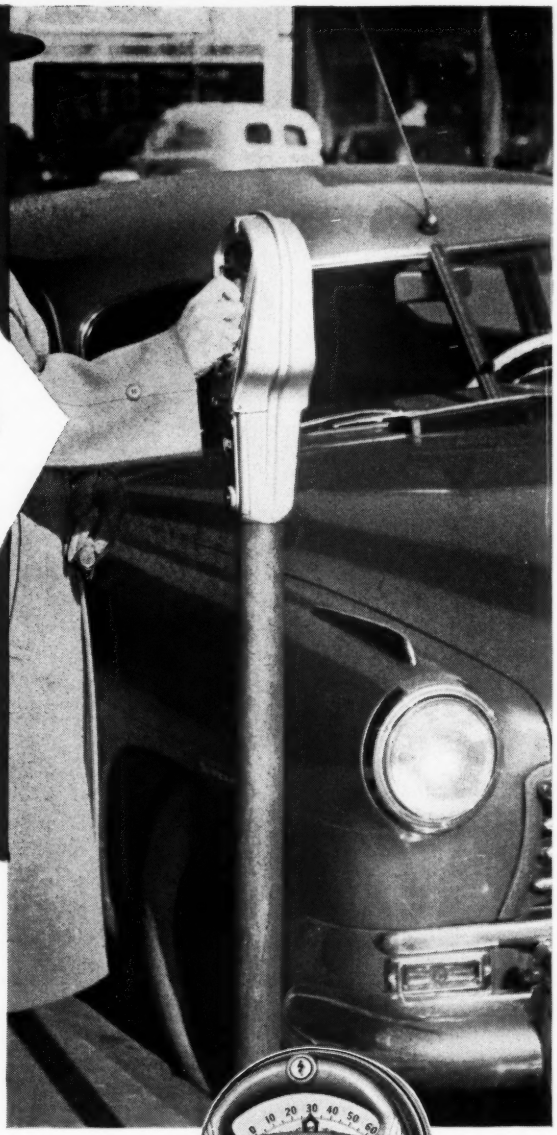

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Frankly Speaking

Figuratively speaking, one of the frequently recurring bouts which the traffic engineer must referee (or serve as second to one of the participants) is that between Mighty (?) Master Plan and Bogey Man-Insufficient Funds. The former of these two participants more often than not takes the count of ten—is cast aside completely, or, after a rigorous session, ekes a draw—a scaling down to something short of optimum but less expensive.

The practical operating engineer, traffic or otherwise, should not be averse to compromise; however, the form of such compromise warrants close scrutiny. Any revision of plans for reasons of economy should not be such as will violate basic proven concepts of good design—concepts which have been tried and tested to the point of being axiomatic in the traffic engineering field. At the risk of falling short of any predetermined progress chart, the better alternative lay in prolongment of final completion date of the over-all program. Insofar as we have control or influence in these matters, let us strive towards quality rather than quantity.

Ofttimes the final decision in these matters rests with a higher level administrative or policy-making body to whom the traffic engineer is subservient, in which case the latter must be a "good soldier". Such circumstance should not, however, forestall the traffic engineer in making the best possible presentation of his "case" as this is presumably what he is being paid for.

In a paper presented at a recent meeting, the author, speaking with reference to design, stated, "Beware, I warn you, of making your designs in miniature, for they will return to haunt you". This might be revised a bit to be more inclusive, "Beware of Compromising your designs in violation of proven concepts for they will return to haunt you". Let us not be submerged in any such ghoulish company.

Director

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What Percent of Highway Construction Costs Should be Paid by the Federal Government

By HAROLD F. HAMMOND (Mem)., ITE)
Manager, Transportation & Communications Dept.,
Chamber of Commerce of the United States

To give adequate consideration to this subject, we must answer this fundamental question, "Do we want a nationalized highway system?" If we say "yes", then it follows that Uncle Sam should gradually take over complete operation, maintenance and construction of our interstate highway system. If we answer "no", then we should consider seriously the effect that increasing the federal percentage would have in bringing us closer to a nationalized system. We have come to a fork in the road in our progress in highway development. We take either the left fork toward an ultimate system of nationalized highways, or we keep on the same road straight ahead, the one we've been traveling in the past, and maintain the traditional balance between state and federal responsibility for our federal aid system.

The Proposal to Increase Federal Participation

The U. S. Bureau of Public Roads proposes to increase federal participation in the cost of improvements on the 37,800 miles of interstate highways to a ratio greater than the normal 50%, "in view of the extraordinary interstate and national interest attaching to the system." Apparently this increase of federal assistance on the most strategic portion of the federal aid system will give a greater assurance of the improvements being made by, in effect, making it cheaper for a state to buy a mile of improvement on the interstate system than to buy a mile of improvement on other sections of the federal aid system. The idea that something special needs to be done to our highways for national defense that we don't need for peacetime purposes is fallacious. The highway system that will best suit our current traffic demands will be the best possible highway system to serve our country in any future war. And the responsibility for developing our peacetime interstate highway system is just as much a state as a federal responsibility. This idea of centering more authority and responsibility in the federal government and less in the state has a hidden but nonetheless potent disadvantage. It is a definite step toward weakening the state's responsibility and strengthening the federal role in the highways picture.

Although the present proposal is to increase the federal aid percentage on only a portion of the total federal aid system, there is strong likelihood that it will lead to the proposal to extend the idea to the entire system. If main highways are considered in need of such extraordinary assistance in the interest of national defense, there's no reason why some can't argue that the rural roads need priority too for national defense. Judging from past performance, there is justification to believe that the increased federal aid idea will spread to all highways, once it gets a foothold on the interstate system.

Past History Shows What Will Happen

Against the contention that this is just a temporary expedient to get us over the hump on an important project, let's not forget that the same arguments were offered about the original federal excise taxes and gas taxes. In the words of the authors of that legislation, they were conceived and enacted as *emergency* taxes for a *temporary* period. Imposed in 1932 as temporary emergency measures solely for the purpose of raising general revenues and to balance the budget during the depths of the depression, these taxes have been extended and increased instead of repealed!

Congressman Robert L. Doughton, Chairman of the Ways and Means Committee of the House, the Committee which originated the taxes, expressed the intent of Congress in their enactment by the following words:

> "This was an emergency tax . . . could we not temporarily endure this tax which, I think, all of us agree is only an emergency and temporary tax?"

That was in 1932. The tax never was repealed. In fact, it has been increased from 1c to 1½c per gallon.

The whole picture of federal aid to highways shows the same trend—once Uncle Sam gets his foot in the door he just doesn't want to get out. The first Federal Aid Act, approved in 1916, was designed solely to improve the nation's rural postal roads. By 1921 the purpose was enlarged to "completion of an adequate and connected system of highways interstate in character." (The idea of a system of 100% federally financed and maintained highways was officially aired and thrown out by Congress at this time.) In 1933, for the first time, federal aid was made applicable to urban streets and secondary roads. The Federal Highway Act of 1940 went further yet, authoriz-

ing application of federal aid to right-of-way acquisition as well as actual highway improvement. Federal aid authorizations rose from $6-million in 1917 to $525-million last year, nearly a hundred-fold increase.

Thus we see how the government has been taking over more and more the direction and financing of the highways program since it began in 1917.

A Look Into the Future

There is every reason to believe that if we depart from the present 50-50 split on federal-state financing, within ten years we will have a fully nationalized interstate highway system, with 100% federal financing. This will lead to increased federal highway user taxes and forty-eight greatly weakened state highway departments that will have become not much more than agents for a National Highway Department.

There would follow the creation of a federal police force to enforce federal traffic regulations on the national highways. This new arm of the law would probably replace the state police on many routes and would represent a new federal bureau employing thousands of people.

The Chamber Favors the Matching Principle

Prior to war emergency legislation, the law required matching of federal funds in equal amounts by states, and they actually paid much more than half of the construction costs of the federal aid system. Partly because of the former per-mile and other limitations on the federal share, partly because the states paid all costs of right-of-way and partly because many of the states able to do so speeded up the program with their own funds, the federal contribution averaged only 6% for the two decades prior to 1930, but it reached 41% in 1936. Proposals have been put before Congress which would "up" the present 50% federal share to as high as 75% on federal aid highways. The Chamber of Commerce of the United States has strongly opposed such bills in the past. At the present time the Chamber's Committee on Transportation and Communications is actively studying this matter of federal aid as well as several other current issues in the highway field, including toll roads, seeking to strengthen and augment our policies.

An Increased Highway Program

Most people will agree that the total program of highway construction and maintenance needs to be accelerated. The recent report of the U. S. Bureau of Public Roads on "Highway Needs of the National Defense" recommends expenditure of over $11-billion for improvements now to meet the needs of today's traffic. I don't know whether this figure is too high or too low. But I do know that many of our highways need a complete overhauling job and a lot of money will be spent soon on modernizing the federal aid system.

Providing the Need Doesn't Imply Federal Responsibility

However, *this point is important*—proving that we need to spend a lot of money on our highways is no proof that the money should come from the federal government. Some people seem to think that just because "X" billion dollars needs to be spent on highways, that Uncle Sam should automatically pick up the check. However, there are two separate and distinct things to be considered here: (1) how many billions total need to be spent, and (2) the relative advantage of getting these billions through federal or through state financing. The extent to which Uncle Sam foots the bill should be based only on the advantage of federal over state financing. For reasons pointed out, we believe there would be serious disadvantage should the federal share be upped to beyond 50%.

The Proper Balance Now Exists

We believe that the proper balance now exists between federal and state governments in highway financing. Upsetting that balance in favor of increased federal participation would produce these disadvantages:

1. Weaken the state highway departments by taking away their responsibilities and authority.
2. Lead us into a completely nationalized interstate highway system, with control centralized in Washington instead of in the 48 state capitals where it belongs. Then cities and other local units of government will have to come to Washington to plead for highway monies, allocation of which will be subject more to political pressures rather than local needs.
3. Leading, as it would, toward a nationalized highway system, it would mean a step nearer the nationalization of other competing forms of transportation.
4. Put the federal government further into debt at a time when the states are far better able to take on the obligation. (The federal debt is $250-billion, yet the debt of the 48 states is only $4-billion.)
5. Whether we like it or not, increased federal aid will increase the pressure for greater federal taxes on the highway user, a thing that no one wants to happen.

We would do well to heed these words of Senator Hayden:

"The Congress has gone on the principle that the roads belong to the state, that the construction should be carried on by the states and that the federal government should merely aid and assist the states to create a national system of highways. This principle is so sound that the Congress has been unwilling to change it for more than a quarter of a century."

New York City Requires Locked Ignition

Effective for pleasure cars December 10 and for commercial vehicles January 1, is the following regulation: "It shall be unlawful for any person driving or in charge of a motor vehicle to permit it to stand unattended for more than three minutes on the streets or thoroughfares of the City without first stopping the engine, locking the ignition and removing the key."

Modern Street Illumination

By J. W. A. BOLLONG (Mem., ITE)
Traffic Engineer, City of Seattle, Washington

UNDERLYING all other objectives, the fundamental purpose of street lighting is to produce the illumination requisite for good visibility at night, and through good visibility to promote safer use of streets and make more effective use of the large investment in street and highway construction.

Adequate night visibility for traffic safety does not imply that it is economically possible or necessary to produce by artificial means street lighting at night equal to daylight illumination. It is economically practicable, however, to provide properly distributed illumination of sufficient intensity to produce the visibility required for safe, comfortable, and convenient use of streets and highways at night.

The fundamental factors which directly influence the visibility of an object are:

Size and brightness of the object.
Contrast in brightness and color between the object and its immediate background.
Size of its identifying detail.
Extent of the interference with seeing, due to glare.
Time available for seeing.

To meet these requirements of visibility, pendant type luminaires at 25 ft. to 30 ft. heights are now being used, which produce:

1st: More light upon the pavement.
2nd: Greater visibility of the pedestrian or object by silhouette.
3rd: Greater pavement brightness.
4th: Reduction of glare.

Adequate visibility for night traffic safety, satisfaction and convenience results from street illumination applied in such manner as to emphasize, by the proper correlation of the above factors ,not only the presence but also the direction of movement of objects within the field of vision.

Street Lighting Study Needed

In designing an installation that will provide effectively the illumination required for the safe use of a street, a careful study of the problem from the following points of view is particularly necessary:

Traffic	Character, speed and volume of vehicular traffic and volume of pedestrian traffic.
Type of Street	Classification according to use of street and abutting property.
Dimension & Design	Width of street and sidewalk areas. Curb contours or absence of curbs.
Street Surface	Type, color and reflection characteristics of paved or unpaved surfaces.
Buildings	Predominating type of construction and character of use.
Transportation	Public transportation facilities by street railway or buses.
Parking	Location of parking lanes, amount and method of parking.
Trees	Presence or absence, kind and height, and height of lower branches.
Accidents	Their location, the time of day, types of accidents (as between automobile and pedestrian and between automobile and automobile) and their location as to intersection or center of the block, with special emphasis placed on pedestrian vs. automobile night fatalities and injuries.

Volume

The volume of traffic is a principal factor in determining the amount of illumination required for safety. Whatever the traffic volume, streets may further be classified with respect to the character of the abutting property. An example of such classification follows:

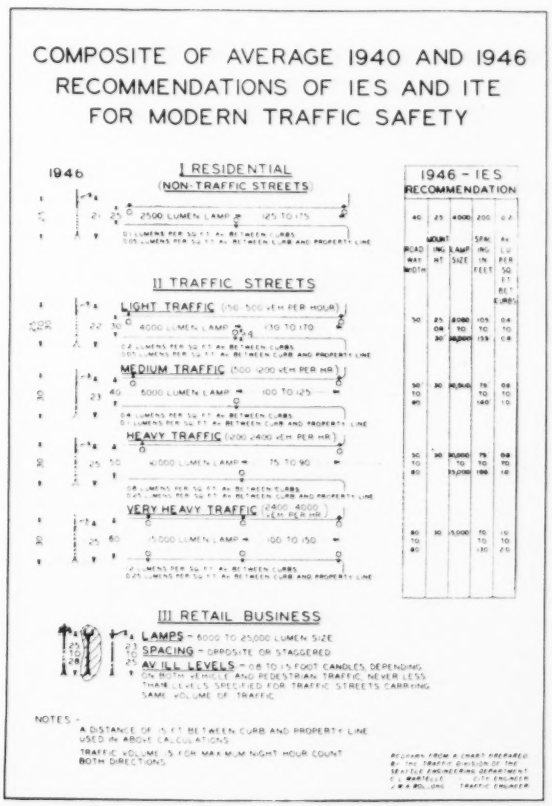

COMPOSITE OF AVERAGE 1940 AND 1946
RECOMMENDATIONS OF IES AND ITE
FOR MODERN TRAFFIC SAFETY
1946
I RESIDENTIAL
(NON-TRAFFIC STREETS)
2500 LUMEN LAMP
125 TO 175
II TRAFFIC STREETS
LIGHT TRAFFIC
4000 LUMEN LAMP
150 TO 170
MEDIUM TRAFFIC
6000 LUMEN LAMP
100 TO 125
HEAVY TRAFFIC
10000 LUMEN LAMP
75 TO 90
VERY HEAVY TRAFFIC
15,000 LUMEN LAMP
100 TO 150
III RETAIL BUSINESS
LAMPS - 6000 TO 25,000 LUMEN SIZE
SPACING - OPPOSITE OR STAGGERED
AV. ILL. LEVELS - 0.8 TO 1.5 FOOT CANDLES DEPENDING ON BOTH VEHICLE AND PEDESTRIAN TRAFFIC, NEVER LESS THAN LEVELS SPECIFIED FOR TRAFFIC STREETS CARRYING SAME VOLUME OF TRAFFIC
NOTES -
A DISTANCE OF 15 FT. BETWEEN CURB AND PROPERTY LINE USED IN ABOVE CALCULATIONS
TRAFFIC VOLUME IS FOR MAXIMUM NIGHT HOUR COUNT BOTH DIRECTIONS
1946 - IES
RECOMMENDATION

Fig. 1

Primary business streets	Boulevards
Secondary business streets	Viaducts and bridges
Industrial streets	Express roadways
Residential streets	Alleys

The traffic classifications recommended by the Committee on Street Lighting of the Institute of Traffic Engineers are as follows:

Classification of Traffic	Volume of Vehicular Traffic (Max. night hour both directions)
Very little traffic	Under 150
Light traffic	150 - 500
Medium traffic	500 - 1200
Heavy Traffic	1200 - 2400
Very heavy traffic	2400 - 4000
Heaviest traffic	Over 4000

Each of these classifications should be considered with regards to pedestrian traffic—heavy, medium, light, or none.

The average illumination in foot candles recommended by the Illuminating Engineering Society's Committee on Street and Highway Lighting is to be the minima that should be delivered on the street to provide a reasonable degree of safety, effectiveness and convenience, as indicated in Figure 1.

Intersection Lighting

Studies have proved that a greater number of accidents occur at street intersections than at any other location on our street system, and that impairment of visibility by darkness greatly increases the hazards of traffic conflicts at intersections. Therefore, the importance of providing adequate visibility at street intersections and approaches thereto cannot be over-emphasized.

Adequate lighting for night safety at intersections can be determined only by studying the volume and pattern of traffic flow and other use characteristics. Intersectional dimensions, complexity of design, location of pedestrian crosswalks, obstructions to vision and accident experience of each intersection should be studied.

The advantageous location of lighting units so that pedestrian crosswalks may be illuminated adequately is of extreme importance in the design of intersectional lighting. Lighting of large intersections will depend upon the width of roadway, volume, and the presence or absence of safety islands or parkways.

Street and Highway Lighting

The original street lights were located largely at street corners to illuminate street signs and provide police protection. Between 1920 and 1930 the creation of "white ways" became popular. Using ornamental light standards, cities strove to outdo each other in the amount of light on top of these standards. Unfortunately these ornamental light standards were created for appearance, not for utility. Much of the light emitted was cast upward and not downward upon the pavement where it was needed. The era of traffic safety lighting brought the design of pendant-type units which directed the light upon the street to create the visibility desired. It is this latter type of street lighting which has become of especial significance to the traffic engineer.

Design Considerations

As the engineer approaches the task of designing an appropriate street lighting system for the specific conditions in his jurisdiction, certain general considerations should be taken into account. These are briefly discussed below.

1. Roadway Brightness:

In order to appear bright, a road surface must reflect light toward the motorist's eyes with a correctly designed system. The road surface brightness as seen by the motorist at night will be affected by luminares 200′ or 300′ ahead, and on a wet night as much as 800′ ahead.

2. Glare:

While seeking adequate illumination, the engineer must also make certain that he has reduced glare to a minimum. Two of the more important considerations in glare reduction are:

(a) Proper control devices in the luminaire itself, such as shielding of the light source, diffusing glassware, etc.

(b) Mounting height with respect to the observer's line of vision.

Experience has shown that if the luminaire is 15° or more out of the normal line of vision, glare will not be objectionable. (See Figure 2.)

3. Location of Luminaires:

The location of the luminaire in relation to the roadway is most important in producing good visibility. It should always be remembered that the brightness pattern is produced by light reflected from the pavement toward the observer. For that reason, highest brightness patterns

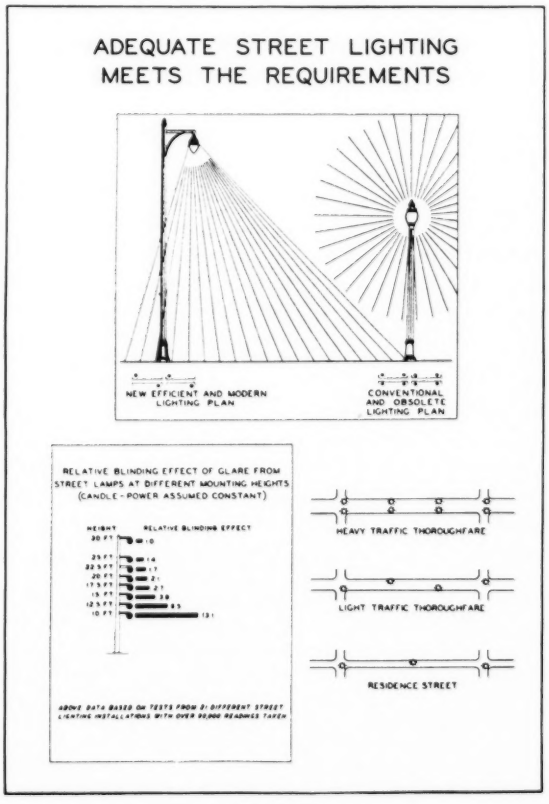
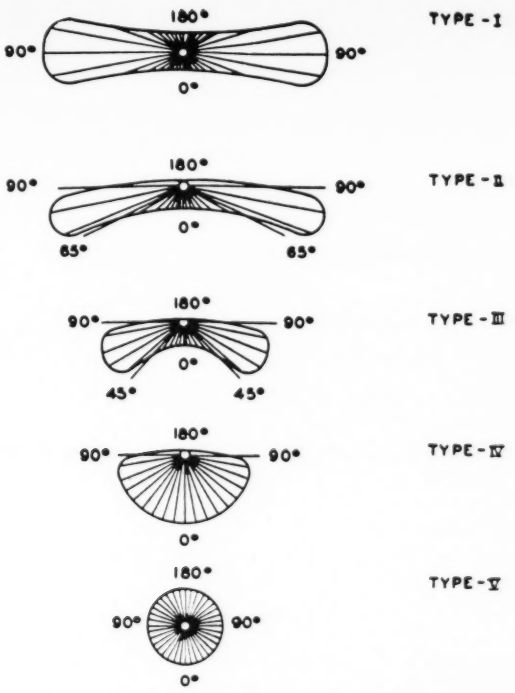

ADEQUATE STREET LIGHTING
MEETS THE REQUIREMENTS
NEW EFFICIENT AND MODERN LIGHTING PLAN
CONVENTIONAL AND OBSOLETE LIGHTING PLAN
RELATIVE BLINDING EFFECT OF GLARE FROM STREET LAMPS AT DIFFERENT MOUNTING HEIGHTS (CANDLE-POWER ASSUMED CONSTANT)
HEIGHT
RELATIVE BLINDING EFFECT
HEAVY TRAFFIC THOROUGHFARE
LIGHT TRAFFIC THOROUGHFARE
RESIDENCE STREET

Fig. 2



Recommended Types of Lateral Light Distribution in the 75 Cone

Fig. 3

always fall in a direct line between the observer and the light source. It usually takes the form of a "T" with the tail of the "T" nearest the observer.

(a) **Intersections.** In general, the classification of the intersecting streets will indicate the amount of illumination to be provided in the intersection area. It should be normally equal to the sum of the illuminating values of the intersecting streets. Silhouetting should, wherever possible, be provided with lights located on the far-side right, beyond the intersection, which arrangement reveals objects to drivers as they cross or approach the intersection. The intersection of streets forming a "T" by dead-ending onto another thoroughfare will ordinarily require more illumination than that specified for either of the intersecting streets. It is essential that adequate indication be provided to warn motorists that the street terminates at that point. Luminaires should be located along the main street on the side opposite the intersecting street.

(b) **Curves.** Luminaires should be mounted along the outside of curves. Spacing should be such that when an automobile is opposite any lamp on the curve, a straight line drawn from the motorist's eye to the second lamp should not intersect the inside edge of the pavement. Spacing on curves will be closer than on the adjacent thoroughfares.

4. Classification of Roadways:

A vehicular traffic volume classification has already been given in Figure 1. This chart shows not only the 1940 recommendations but in addition the 1946 recommendations of the I.E.S. These classifications with regard to minimum average illumination in lumens per square foot on the roadway are summarized below:

	1940	1946
Very Little Traffic	0.1 lumen	0.2 lumen
Light Traffic	0.2 lumen	0.4 to 0.8 lumen
Medium Traffic	0.4 lumen	0.6 to 1.0 lumen
Heavy Traffic	0.8 lumen	0.8 to 1.0 lumen
Very Heavy Traffic	1.2 lumen	1.0 to 2.0 lumen

5. Luminaire Characteristics and Applications:

With the variation in street widths—that is, distances between curbs—there are 5 typical ideal candle-power distribution types recommended by the 1946 I.E.S. Standard. These are shown in Figure 3 as Types I through V.

Type #1 Luminaire:

2-way distribution intended for luminaire mounting for approximately over the center of the street. It projects 2 beams of light in opposite directions on the street. The axis of these beams being parallel with the curb. It is intended for very narrow streets.

Type #2 Luminaire:

Narrow asymmetric distribution intended for luminaire mounting at or near the side of the street but having a lateral width up to 45° in the cone of maximum candle power at approximately 75°. It is intended for narrow streets.

Type #3 Luminaire:

Medium-wide asymmetric distribution intended for luminaire mounting at or near the side of the street but having a lateral width up to 45° in the cone of maximum candle power at approximately 75°. It is intended for wide streets.

Type #4 Luminaire:

Wide asymmetric distribution. Intended for luminaire mounting at or near the side of the street, but having a lateral width up to 90° in the cone of maximum candle power at approximately 75°. It is intended for very wide streets.

Type #5 Luminaire:

Symmetric distribution; intended luminaire mounting approximately over the center of the street. It is for a wide distribution. The maximum candle power being at approximately 75° and the cone being the same throughout the 360°. It is used on installations in center parkways and to some extent for intersections.

The mounting heights, spacing, roadway widths, lamp sizes in lumens and average foot candle distribution are all as shown on the chart for both the 1940 I.E.S. recommendations and the 1946 (See Figure 1.)

Self-Controlled Street Lights

The world's first major installation of street lights which are individually self-controlled by photoelectric cells was completed recently at *New Milford, Conn.* The photoelectric control unit built into the luminaires is set so that the lights go on when the prevailing natural light wanes to one foot-candle. They turn themselves off again when the natural light goes above this level.

The Stability of Results of a Parking Survey

By FRANK T. WHITE (Jun. Mem., ITE)
Junior Civil Engineer, California Division of Highways, Berkeley, California

IN ORDER to locate off-street parking facilities in the places which will serve the parkers best, many cities have conducted extensive parking surveys. It is probable that a large number of these surveys will be conducted in the future in other cities, and that many off-street parking facilities will be located in conformity with the results of these surveys. It is essential that the survey results provide a true and accurate picture of the desires of parkers, so that the investment of money and land in parking facilities may be made to the best advantage.

The Bureau of Public Roads has developed a standard method of making these surveys,[1] which involves the interviewing of parkers as they leave their cars, asking questions about their destinations, purpose of trip, etc. The study is made throughout the entire central business district, parkers at each curb parking space and off-street facility being interviewed for a period of one day. On the basis of this one day sample of all parking spaces the intensity of parking demand is obtained.

Some question has been raised as to the use of a a sample of only a single day, when the parking pattern may change radically from day to day. The variability of drivers is such that there is no assurance that a series of interviews taken on any one day is typical of the normal pattern of parkers in a city.

This study was made with the purpose of investigating the stability of parking demand, and the variation of pattern for different times of day. The variation of pattern was investigated between different days, and between morning and afternoon of the same day. An attempt was made to define the size of sample required for stability, and to determine whether the present method of interviewing for only on day gives satisfactory results.

The possibility of finding a method of sampling in making parking surveys was investigated, to determine whether interviewing for a complete day is required. If the desired accuracy can be obtained by interviewing for one-half or one-quarter of a day there might be a great saving of time and money, both in the obtaining of the data, and in the later reduction to usable form. The data obtained in any survey is only a sample of the total parking operations, because the interviewers are bound to miss a few of the parkers, and because the survey is not conducted through a full 24 hour day.

In locating proposed off-street parking facilities such factors as existing buildings and land and building costs will to a large degree modify the selection of locations based only on destinations of parkers. For this reason it is assumed an error as large as 100 feet in the determination of centroids of destination is of little significance in a downtown parking survey.

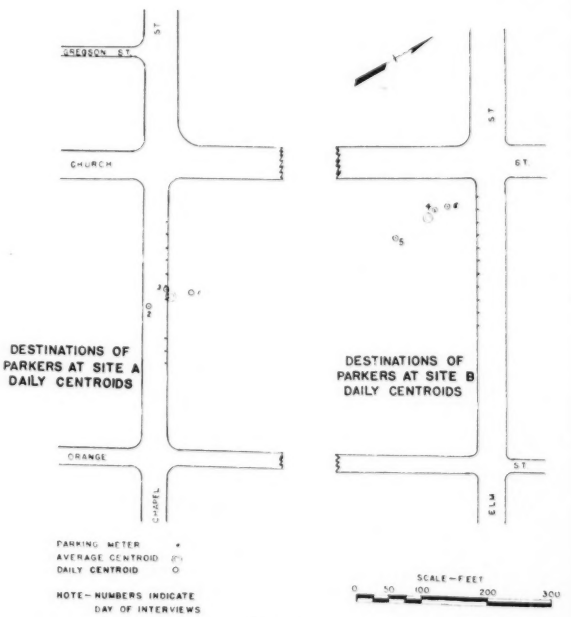


Fig. 1

Field Methods

Investigation was made of the destinations of parkers at two locations in the downtown area of New Haven, Conn. Site A, the north side of Chapel Street east of Church Street, is in the heart of the shopping and business district, and the demand for parking spaces greatly exceeds the supply. Site B, the south side of Elm Street east of Church Street, is on the fringe of the downtown area, where the demand for parking is much less. Interviews were made for ten parking spaces at Site A, and for eleven spaces at Site B. Thirty minute parking meters were installed at both locations. At Site B the demand for

1. Manual of Instructions for a Parking Study; Bureau of Public Roads, 1946.

parking was not great, and one or more spaces were usually vacant throughout the day.

Interviews were made at each location on three Tuesdays, between 9:00 and 11:00 A.M. and between 1:00 and 3:00 P.M. An attempt was made to obtain a 100 per cent sample of parkers in the spaces covered, rather than a fractional sample of a larger number of spaces.

Interviews were made as the parker was placing coins in the parking meter; this did not unduly delay the parkers, and encouraged their cooperation. Only the primary or first destination was recorded for those parkers who planned several stops. Each interview took approximately ten seconds, and no parkers were encountered who refused to answer the questions.

At every fifteen minute interval during the period of interviewing an inventory was made of the occupancy of spaces. The last three numbers of the license plate were recorded on an inventory sheet for each car occupying a space. From this data the turnover of vehicles per space could be found, and a check could be made on the number of interviews made for each space.

The following table shows the number of interviews made for each day of interviewing:

Day	Date	Spaces	Number of Interviews			
			A.M.	P.M.	Total	Per Space
1	2/15/49	10	18	27	45	4.5
2	3/ 8/49	10	17	24	41	4.1
3	3/15/49	10	19	19	38	3.8
4	3/22/49	11	20	29	49	4.4
5	3/29/49	11	23	19	42	3.8
6	4/ 5/49	11	32	27	59	5.4

Computation

The location of each parking space where interviews were made and each destination given by a parker was plotted on a map drawn on cross-section paper to a scale of 1″ = 100′. The coordinates of the destination, referred to the parking space used as origin, were then scaled from this map, and recorded on the data sheet. The total of these coordinates for any period of time, divided by the number of interviews made, gives the coordinates or lever arms of the centroid of destinations. These coordiates, plotted from the center of all the parking spaces studied, showed the location of this centroid.

For each site the average *centroid* was located for all interviews made during the three days of interviewing at that site. Other centroids were found for morning and afternoon interviews on each day, and for total daily interviews; possible methods of sampling the interviews were also investigated.

Average Centroids

It was assumed that the average centroid represented the actual desires of parkers at that site, and all other centroids were judged according to their proximity to the average centroid. The term "error" when used in this study means the distance of any sample centroid from the average centroid. The term "spread" means the distance between two sample centroids, measured parallel to the street.

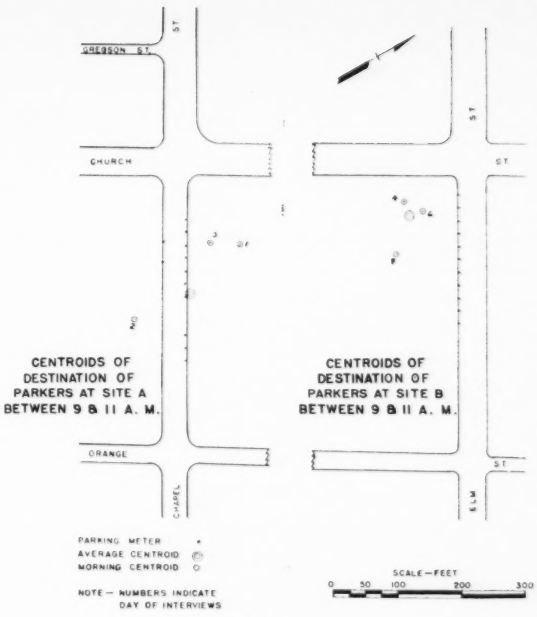

OREGON ST.
CHURCH
ORANGE
CHAPEL
ST
CENTROIDS OF DESTINATION OF PARKERS AT SITE A BETWEEN 9 & 11 A. M.
CENTROIDS OF DESTINATION OF PARKERS AT SITE B BETWEEN 9 & 11 A. M.
PARKING METER
AVERAGE CENTROID
MORNING CENTROID
NOTE — NUMBERS INDICATE DAY OF INTERVIEWS
SCALE—FEET
0 50 100 200 300

Fig. 2

Daily Centroids

Figure 1 shows the centroids obtained from each day's interviews, compared with the average centroids. For Site A the three daily centroids are grouped in a line; the maximum error is 35 feet, and the maximum spread is 25 feet. A similar grouping is found at Site B, with a maximum error of 65 feet, and a maximum spread of 50 feet. These results indicate that there is very little variation in the destinations of parkers on different Tuesdays, at both of the interview sites studied.

Morning Centroids

Figure 2 shows the centroids computed from interviews made between 9:00 and 11:00 A.M. For Site A these morning centroids are more widely spread than the daily centroids, with a maximum error of 110 feet, and a maximum spread of 120 feet. For Site B the grouping is about the same as for the daily centroids, with a maximum error of 60 feet, and a maximum spread of 80 feet.

Afternoon Centroids

Figure 3 shows the centroids computed from interviews made between 1:00 and 3:00 P.M. For Site A these afternoon centroids are located along Chapel Street, and are more compact than the morning centroids. The maximum error is 80 feet, and the maximum spread is 70 feet. For Site B the afternoon centroids are more widely spread than the morning centroids, with a maximum error of 90 feet, and a maximum spread of 30 feet.

The consistency of the results obtained at both sites by interviewing for only two hours is good. A turnover of approximately one car per space per hour was obtained during the study; these results indicate that for this turnover two consecutive hours of interviewing will give an

accurate location of the centroid of destinations of parkers in the downtown area.

Sampling of Interviews

To investigate the stability of the results of the study, and to examine the possibility of using sampling methods in obtaining data in future studies, two types of samples of the interviews were selected and combined to give sample centroids. Samples of one-half and one-quarter of the interviews were selected at random from the interview sheets. At Site A the maximum errors are 60 feet for the one-half sample and 95 feet for the one-quarter sample. At Site B the maximum errors are 75 feet for both samples, and the maximum spreads are 70 feet for the one-half sample and 10 feet for the one-quarter sample.

The one-quarter sample of four hours of interviewing is approximately equivalent to the number of interviews obtained by one hour of interviewing. The closeness of the sample centroids to the average centroids indicates that a sample of only one or two interviews per parking space is required for a stable centroid of destination.

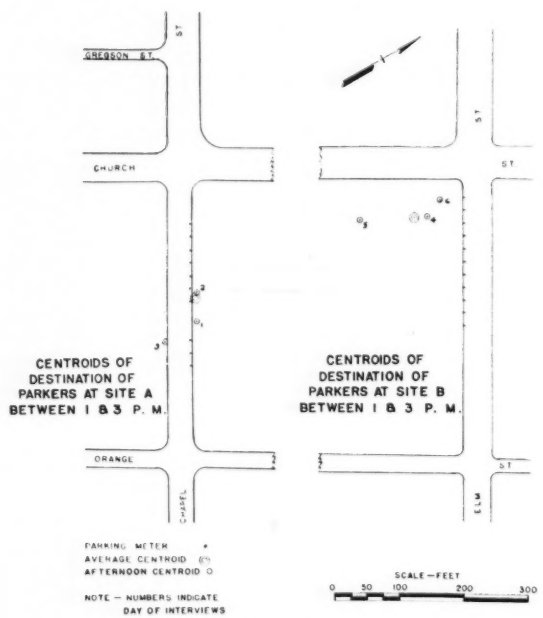

OREGON ST
CHURCH
ORANGE
CHAPEL
ELM
CENTROIDS OF DESTINATION OF PARKERS AT SITE A BETWEEN 1 & 3 P. M.
CENTROIDS OF DESTINATION OF PARKERS AT SITE B BETWEEN 1 & 3 P. M.
PARKING METER
AVERAGE CENTROID
AFTERNOON CENTROID
NOTE — NUMBERS INDICATE DAY OF INTERVIEWS
SCALE—FEET
0 50 100 200 300

Fig. 3

Conclusions

Only one important difference in parking was found between Site A in the heart of the downtown area, and Site B on the fringe of the area. At Site A the demand for parking was much greater than the supply, and vacant spaces were rare. At Site B there were usually one or more spaces vacant. No difference was found in accuracy of samples or stability of results.

There was no significant variation in the destinations of parkers on different Tuesdays; this is assumed to be a typical weekday.

For both locations there was no error great enough to be important in the selection of an off-street parking facility in any of the morning or afternoon centroids, when compared with the average centroids.

The one-half and one-quarter samples of interviews gave results as accurate as those of the morning and afternoon centroids. The one-quarter sample was approximately equivalent to interviewing for one hour, or obtaining one interview per parking space.

Further studies on a larger scale may confirm the results of this study, that only one or two hours of interviewing in a parking survey will give results as accurate as those obtained by the present method of interviewing for nine hours. If this is proved true, it will result in a great saving in time and money in any future parking surveys which may be made.

Mr. White was a student at the Yale Bureau of Highway Traffic during the academic year, 1948-49. The material for this article is taken from his thesis of the same title.

Rubber Roads Undergo More Testing

Interest in so-called rubber roads is continuing to grow.

Massachusetts has joined the list of states which will test the advantages of adding rubber to road surfaces. Experiments are being carried out on two sections of highways there, one on the Concord Turnpike and another on a city street in Wrentham. The surfaces will be bituminous concrete in which 5 to 10 per cent rubber is added.

Massachusetts State Public Works Commissioner William F. Callahan has said the most important consideration in the tests is to find out how the rubber-treated roads will stand up after a deep frost that is followed by thawing.

"If rubber will keep the pavement from erupting, the state will save a lot of money," Callahan said. He reported that the cost of laying 1,000 feet of rubber-treated surface will be approximately $9,000, only slightly above the normal cost of bituminous concrete.

In Virginia, results of six months of tests on roads in whose surfaces rubber was used were revealed by the Virginia State Highway Department. The tests found skidding was materially lessened. A car traveling 40 miles an hour was brought to a stop within 87.5 feet, compared with 101.2 feet on a highway with no rubber content.

—Highway Highlights

Accident Prevention in the Trucking Industry

By O. D. SHIPLEY

Safety Director, Pennsylvania Motor Truck Association, Harrisburg, Pa.

THE UNITED STATES has three-fourths of the world's motor vehicles—enough to transport our entire population at one time with room to spare—with one mile of road for every square mile of area. More than 40 million Americans own and operate individually the vehicles in our transportation system.

The curtailment of accidents in highway travel is an undertaking as complex as the transportation system itself. There is no short cut to safety—no magic formula will solve this problem overnight. It will take a "grass roots" program, a balanced and continuing program, to obtain the desired results.

Any permanent reduction of traffic accidents will come from impartial enforcement of traffic regulations; from modern engineering of roads and vehicles; from education of both drivers and pedestrians; and from uniform rules of the road throughout the entire nation. This reduction will require more than a publicity campaign or periodic flurries of promotion. It calls for a large scale continuous working effort that encompasses all of the elements of highway safety.

The organized trucking industry in Pennsylvania is continuously carrying on year after year a comprehensive program that covers every phase of this complex problem. The principal elements of this program, designed to be a definite aid to all truck operators, are as follows:

(1) Accident Prevention Conference
(2) Minimum Requirements—Motor Carrier Safety Program
(3) Highway Safety Patrol
(4) Community Traffic Engineering Service
(5) Mobile Safe Driver Clinics
(6) The Porto Clinics
(7) Highway Hazard Reporting Service
(8) Driver of the Month Award
(9) Speakers Bureau—Film Loan Service
(10) Chapter Safety Committees
(11) ATA National Highway Courtesy & Safety Program
(12) ATA National Truck Safety Contest

Accident Prevention Conference

The Accident Prevention Conference composed of 130 fleet safety men headed by Chairman W. Robert Smith of Altoona, Pennsylvania, meets bi-monthly to discuss the effectiveness of PMTA's state-wide program and to develop new phases of the program. Members of this conference are for the most part actively engaged in motor carrier safety work. Active participation in meetings provides a wealth of practical experience on matters of a technical nature.

One of PMTA's Safety Patrol Cars. These cars are completely equipped with first aid equipment, blankets, tools and fire extinguishers. In addition to patrol activities many stranded motorists are given assistance.

Minimum Requirements—Motor Carrier Safety Program

This printed publication was formulated by a committee of experts and is designed to be useful to the operator of one truck as well as the large fleet operator. It contains all basic elements of an accident prevention program.

Highway Safety Patrol

Three white safety patrol cars are operated directly from State Headquarters. Observation reports are turned in daily, and a copy is forwarded to the owner of the vehicle observed. Speeding, tail-gating, caravaning, reckless driving, excessive noise or other violations are slowly being ruled out of the picture. Twenty-seven additional patrol cars are operated by member fleets. Although, primarily interested in their own vehicles, they are participating in the state-wide program by turning in a constant flow of "observation" reports. New cars are being added and preliminary studies indicate that the presence of these cars on the road is exerting a definite influence on the behavior of drivers.

Community Traffic Engineering Service

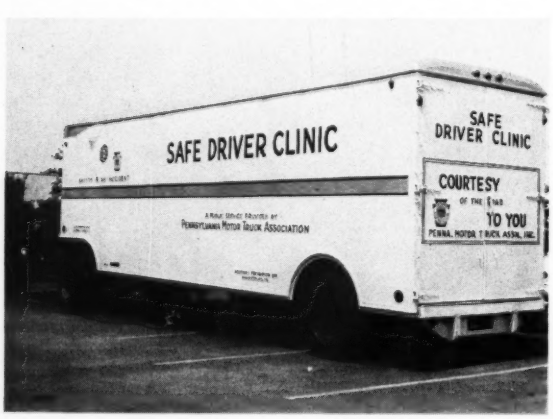
Where accident trends indicate an abnormal situation or where a request is received for aid from a community a careful survey is instigated, usually in cooperation with state and local officials. Specific written recommendations are made citing corrective action necessary to eliminate accident causes. Since the inception of this service, evidence of a glaring need in our larger communities for the services of either a full or part time traffic engineer has been recognized. The securing of a qualified engineer is often recommended. This service has been received gratefully in all cases with almost 100% results in putting recommendations into operation.

Mobile Safe Driver Clinics

The Accident Prevention Conference has been furnished two large trailers by the Fruehauf Trailer Company, and Trailmobile Company. These trailers have each been converted into mobile clinics by installing the best psycho-physical test equipment available.

They are being used primarily by fleet operators as a part of their driver training programs. These clinics are also being made available to schools, civic groups, county fairs, police training schools and as a part of community safety programs where they are used for testing as many drivers as possible each day.

Approximately 18,000 drivers have been tested to date. Preliminary evaluation of test results reveals that, if they were confronted with periodic re-examinations, an astonishingly high percentage of the drivers tested do not have adequate vision to retain their driver's license. Names of drivers tested are not taken, but each person is given a booklet with his score on each test indicated. The booklet includes an explanation of the test and means of compensating for indicated deficiencies.



Exterior View of One of the Mobile Clinics

The Porto Clinics

Supplementing the use of the mobile clinics are the new portable test clinics developed by the Porto Clinic Instrument Company of New York City. They are used extensively by operators with only a few drivers, for whom the transportation and use of the large mobile clinics would be impractical.

Interior of one of the Mobile Clinics showing the testing of drivers in full swing.

The Porto Clinic weighs only 28 pounds. Despite its small size and ease of handling it is an extremely accurate psycho-physical unit for driver testing. Tests include visual acuity, lateral vision, color determination, depth perception and reaction time. Many large operators with drivers working from several widely separated terminals are adopting the new Porto Clinic as an accurate, economical method of driver testing.

The Porto Clinic is also an excellent medium for demonstrating and explaining the various psycho-physical tests as a part of lectures to civic clubs, schools, etc.

Highway Hazard Reporting Service

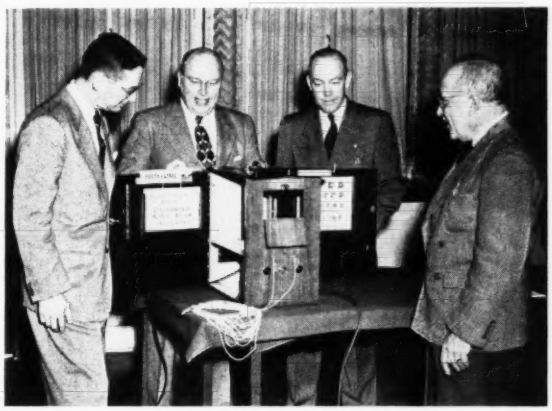
Where action cannot be secured locally to correct unsafe highway conditions, Association members are requested to refer their problems to State Headquarters. Referral of specific cases is made directly to the Department of Highways. In some cases the assistance of the Bureau of Highway Safety, the Public Utility Commission or the Pennsylvania State Police is requested. The cooperation received from all branches of the state government has been outstanding and correction has been secured in numerous cases.

Driver of the Month Award

This program, formulated by the American Trucking Association and carried on in each of the 48 states, is recognized as a valuable asset in our accident prevention program.

A "Driver of the Month" is selected each month by an impartial board of judges from nominations received, which cite long records of accident-free driving, outstanding acts of heroism, courtesy or safety, or a combination thereof. Men selected are honored at a presentation ceremony with an engraved certificate and gold lapel pin emblematic of the award. In some cases the driver being honored is given an additional award by his employer. A "Driver of the Year" is selected annually from the twelve monthly winners. In addition to a certificate emblematic of his achievement he is presented with ap-

propriate gifts from PMTA's Accident Prevention Conference and also becomes eligible for consideration by an ATA board of judges for national "Driver of the Year" honors.



Hotel Hershey, Hershey, Penna., November 4th, 1949
Demonstration of the new Porto Clinic purchased by the Accident Prevention Conference of the Pennsylvania Motor Truck Association. This was the first Porto Clinic placed in active use in Pennsylvania.

Photograph left to right—Mr. Richard Sheppard, President, Porto Clinic Instruments, Inc.; Raymond K. Gillen, Governors Highway Safety Advisory Committee; O. D. Shipley, Safety Director, Pennsylvania Motor Truck Association, and Walter Matthews (Mem., ITE), Managng Director, Philadelphia Safety Council.

Speakers Bureau-Film Loan Service

This service furnished speakers for civic clubs, parent-teacher associations, safety meetings, high school assemblies, etc. Speakers have available for dramatizing their talks the Magno Saf-T board, the Porto Clinic and two detonators for outside demonstrations of emergency stops.

A small supply of films on traffic safety is available at State Headquarters for loan to any group at any time. Additional help is given in securing films for any occasion from film catalogs on file.

Chapter Safety Committees

Working in close cooperation with the Accident Prevention Conference, there are fifty-one (51) County Chapter Safety Committees in the state. These committees confine their activities for the most part to local problems, holding monthly meetings to outline their program and discuss progress on each phase of their overall program.

ATA National Courtesy and Safety Program

This program, formulated by the American Trucking Association, is simply a method of supplying ammunition for the State Associations and their County Chapter Committees.

A separate topic is selected each month with material placed in a two part folder labeled, "What To Do" and "How To Do It". Sample posters, newspaper releases and mats, and material for radio broadcasts are carefully prepared and forwarded to each unit in the field.

ATA National Truck Safety Contest[1]

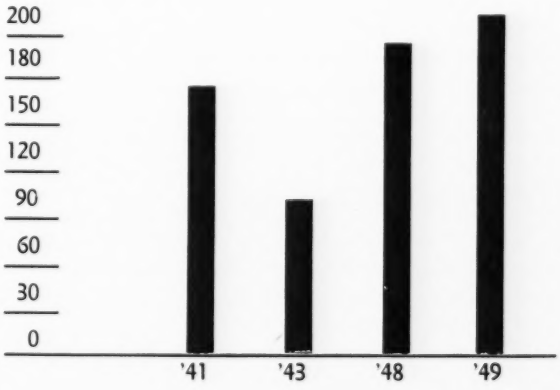
This tremendous nation-wide program, sponsored by the American Trucking Association, is a potent factor in stimulating aggressive truck operator accident prevention programs. Each entry is credited with a maximum of 25 points for an adequate safety program and 75 points for the best accident experience. Points are deducted from the latter for chargeable accidents. Divisions of competition are based on the types of carriers, with a further breakdown into classes and mileage groups. Reporting is simply a monthly accident summary from each contest entry. Winners in each class are presented with trophies, second place winners are awarded plaques and third place winners are awarded certificates. Pennsylvania operators have been honored as winners of many classes during the past years.

My summarization will be brief. The writer believes that the entire subject of traffic safety is OVERTALKED AND UNDERWORKED. Our entire program in the Pennsylvania Motor Truck Association is founded on the idea that it must be a WORKING program. It must be a program that is aggressive and continuous and one that is directed toward the elimination of the primary causes of traffic accidents. To that end we are dedicating our efforts.

Ed. Note: PMTA's outstanding highway courtesy and safety activities won the ATA 15th National Truck Safety Contest in the Association Division for 1949, the fourth time that the honor came to the organized truck operators of this state. New activities by truck operators in this state through PMTA, which weighed heavily in winning honors, included **appointment of a full-time director of safety**, organization of highway safety observation patrols, provision of two mobile safe driver clinics in semi-trailers, and continuation of all other safety and courtesy programs previously inaugurated.

Traffic Trends

VEHICLE — MILES OF TRAVEL — BILLIONS



TRAVEL ON RURAL ROADS FOR THE TWELVE MONTHS OF 1941, 1943, 1948 AND 1949.

Based on Public Roads Administration Data

By J. Carl McMonagle (Assoc. Mem., ITE)
Director, Plann. & Traff. Div.,
Michigan State Highway Dept.

The Michigan Re-signing Program

SEVERAL new and highly interesting modifications of design are included in the Michigan State Highway Department's $1,500,000 program for re-signing the entire state trunkline system, urban and rural. This program, the first to be undertaken as a Federal Aid signing project, is planned for completion in two years.

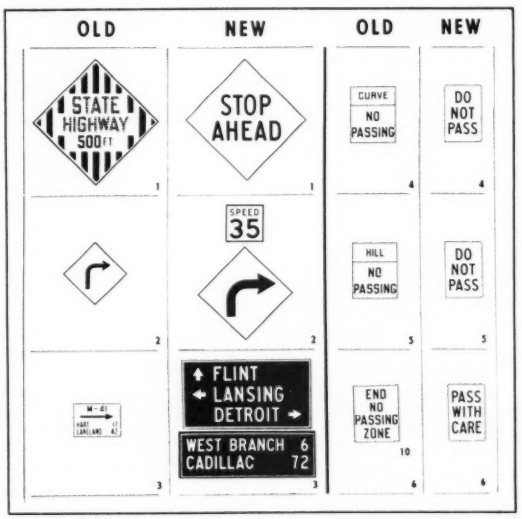
In selecting designs and specifications, the Department followed closely the standards set up in the Manual on Uniform Traffic Control Devices. However, in certain instances changes were made to meet Michigan conditions or to achieve improved results. Such modifications received Bureau of Public Roads approval.

Most of the changes were made to meet the requirements of today's higher traffic speeds. Greater over-all dimensions of panels, larger lettering and shorter, more direct messages, are the methods used for this purpose. The accompanying plate compares the old with the new forms of some of the more important of the revised signs.

The sign giving warning of approach to a trunkline route, has been revised to read "STOP AHEAD." In this simplified form it can be read far in advance under any light conditions. In like manner, the curve warning is a larger panel with a bigger curve symbol and in cases where the curve is sharp or lacks desirable superelevation the practical speed is suggested by a square speed panel just "above" the curve sign.

The distance and direction sign at intersections was also revised. On the theory that the standard sign is too small and carries too much information, Michigan has divided its functions between two new and larger panels. One, placed in advance of the trunkline intersection, points the direction to two or more named cities. The other, placed on each route leaving the intersection, states the distance to the next urban place and to the nearest important city on that route. The latter sign serves the double purpose of giving distance information and confirming that the motorist is on the right road.

Simplification is also the objective of changes in signs



at no-passing zones. Standard practice specifies three different panels in these locations, the two to mark the beginning of a zone telling whether the reason for the restriction is a curve or a hill.

Believing that a driver can recognize the nature of the condition for himself, Michigan engineers use a new sign whose brief message, "DO NOT PASS," is immediately legible. Likewise, the standard sign marking the "End of No-Passing Zone," is replaced by one bearing the injunction, "PASS WITH CARE." These messages are both simple and direct and should gain increased driver attention and compliance.

All of these signs comply with the general design and color standards to which the public is accustomed. Changes are largely in detail and emphasis, but Michigan traffic engineers believe they will result in quicker and more accurate warning and guidance to the motorist. The acquiescence of the Bureau of Public Roads engineer indicates that they may share this opinion.

Transport Topics

Statistics compiled recently by the British Road Federation reveal interesting facts on Britian's roads and road transport. For instance:

Great Britain, with 19 motor vehicles to every mile of road, has the most crowded highways in the world. The United States, seventh on the international list, has 12 vehicles to every mile.

If all the 3½ million vehicles in Great Britain were to appear on the roads at the same time, there would only be ninety yards between each one.

A single stop and restart at 35 m.p.h. causes as much wear to tyres as one mile driving. It also consumes as much fuel as traveling 300 yards at the same speed.

Out of a total of 183,000 miles of road in Britain, over 46,000 miles are restricted—one mile in every four and a half.

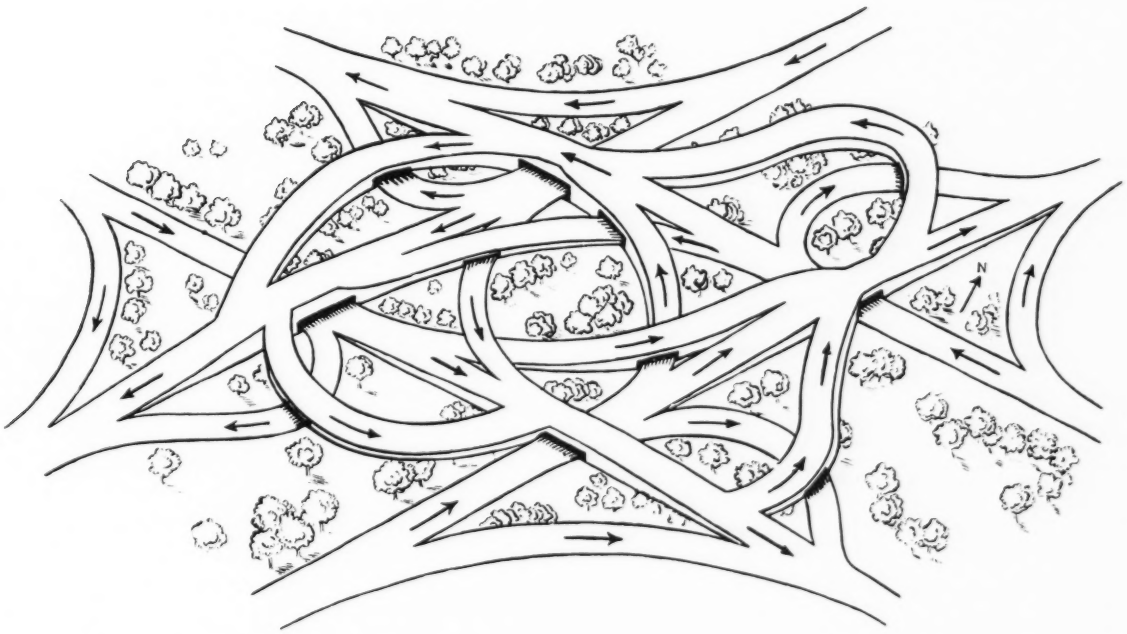
Out of every £ earned in Britain 1/6d. is spent on running cars, lorries and buses. For those who like astronomical figures, this works out at £648,000,000 from a national income of £8,500,000,000—£13 for every man, woman and child in the country.

In the old days, a trotting horse usually covered 8 miles an hour. Traveling between Euston and Trafal-

Open Discussion

By Earling Horn
1940 Gouldin Road
Oakland, California

Modified Hammond Interchange
Safety First — Cost Secondary



THE above sketch is a little refinement on Mr. Hammond's proposal published on page 132 of the December issue.

A second choice of left turns is included in this scheme to augment the already double choice of right turns. Happily, the new, belated, left turn lanes occur all at the upper level, thus not involving any additional grade difficulties which I fear are already present (assuming that this whole interchange does not occupy an area in excess of half a square mile).

As Mr. Hammond implies, cost is certainly not a factor here. The cost of signing his scheme alone, I believe, would be excessive if not impractical. Even more difficult would be the job of placing signs and pavement markings to properly guide motorists through the maze which I have attached.

Briefly, Mr. Hammond has reduced all traffic conflicts to that of the interchange shown on the front cover of the December issue with the addition of a secondary right turn choice which introduces doubtful benefits. You will note that the straight through movement is subjected to a "squeeze play" at the point where both right turns enter. This could cause trouble, especially in the case of a heavy right turn movement and probably should be corrected by use of accelerating lanes, or some other means.

---

gar Square, or Ludgate Circus and Commercial Road, a 20 horsepower car averages less than 7 m.p.h. during business hours.

In 1946, motor vehicles in Britain ran 18,000 million miles, or roughly 700,000 times the distance round the earth. This enormous composite journey took 900 million hours.

Road transport is the third largest industry in the country, only agriculture and building being larger. Employees number 1,300,000.

If every motor vehicle is forced to make one stop per day at a traffic signal, the value of the time and operating costs wasted amount to £1,000,000 a year.

Ten million tons of coal are transported by road every year.

During a test on a scientifically designed motorway, a six-cylinder car was driven 100 miles. Four gear changes were made and the brakes applied three times. On an ordinary main road, while covering the same distance, gears had to be shifted 102 times and brakes applied 491 times.

On a road carrying 6,000 vehicles a year—a not unusual number—a minute's delay per vehicle per day costs £5,000 a year.

—*Transport Management*

TRAFFIC NEWS

Copell First "Getting Results" Award Winner

Edgar F. Copell (Mem., ITE), traffic engineer for the Masachusetts Department of Public Works, has been awarded first prize in the annual "Getting Results Through Traffic Engineering" competition, the Association of Casualty and Surety Companies announced recently.

Mr. Copell's $100 prize-winning example of improved traffic conditions —the reconstruction of a highway curve in Massachusetts which reduced injuries 78 per cent—was voted the best "case history" published during 1949 in the bulletin, "Getting Results Through Traffic Engineering," issued by the Accident Prevention Department of the Association.

The bulletin, on page 245, serves as a trading post of ideas for solving traffic headaches and is sent to over 2,400 officials throughout the country. Actual examples of reduction of street and highway traffic accidents and congestion are submitted by engineers, police and other traffic officials.

Judges of the nationwide contest were Burton Marye, assistant chief engineer, Virginia Highway Department, American Association of State Highway Officials; J. E. P. Darrell, traffic engineer, Minnesota Highway Department, Institute of Traffic Engineers; John M. Gleason, Chief of Police, Greenwich, Conn., and president, International Association of Chiefs of Police; David M. Baldwin, director, traffic and transportation division, National Safety Council; and Theodore M. Matson, director, Yale Bureau of Highway Traffic.

Other traffic solutions considered for the award represented successful traffic engineering projects in the states of California, Delaware, Massachusetts, New York, and in the cities of Portland, Ore.; San Francisco, Calif.; and Utica, N. Y.

These and other examples of serious traffic problems which were solved demonstrated the "positive value" of good engineering practices in reducing traffic accidents and congestion on the streets and highways of the nation, according to Julien H. Harvey, Manager of the Accident Prevention Department, Association of Casualty and Surety Companies.

Mr. Harvey also revealed that a $100 prize will continue to be awarded annually for the best example of "Getting Results Through Traffic Engineering" as a means of promoting greater safety throughout America. Examples should be sent to the Accident Prevention Department, Association of Casualty and Surety Companies, 60 John Street, New York 7, N. Y.

WORLD RUBBER CAPITAL GETS WORLD'S LARGEST STREET LIGHTS—*Akron, Ohio,* world tire champion, now boasts the biggest street lights installed anywhere. They're 25,000-lumen giants 21 inches in diameter and nearly a yard high. 65 lamps have been installed along Main Street, the city's principal thoroughfare. The entire installation of 180 fixtures is due for completion this year.

Future Motor Cars to Have Gas Turbines

Gas turbines for automobiles which hold many advantages over present reciprocal engines, were predicted for the relatively near future at the meeting in Erie, Pennsylvania, of the American Society of Mechanical Engineers by Prof. Frank L. Schwartz of the University of Michigan, Ann Arbor.

In the United States, several companies have already built small gas turbine engines designed for use in automobiles. Two automotive gas turbines in England have been under development for several years, he said. Czechoslovakia is reported to have announced the development of an automobile propelled by a gas turbine having from sixty to eighty horsepower. It is said that it will operate on naphtha, coal gas, hydrogen, acetylene, butane or gasoline.

Advantages of the gas turbine as an automobile power plant listed by Schwartz, include smaller and lighter than present engines, fewer moving parts, low oil consumption, no need of anti-freeze, smooth operation, elimination of automatic transmissions, and the ability to use low-grade fuels, that is, fuels that do not require a high degree of refining.

Gas turbines can effect a 50 per cent saving in engine weight, he stated. It gives about seven times as much exhaust gas, but the gas is cooler than from the reciprocating engine. The hot gas flowing from the rear of a gas-turbine-propelled vehicle is no different from that of the conventional automobile.

There are many problems to be solved before the gas turbine becomes a practical machine that is competitive with the reciprocating engine for vehicle propulsion, he added. Progress to date on gas turbines does not indicate that these problems cannot receive adequate solutions.

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8-49

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Free Parking Lots Help Create 'Fastest Growing City in U. S.'

Silver Spring, Maryland, which lies just outside of Washington, D. C., claims it's the nation's fastest growing town—and that its free downtown parking lots are the big reason.

How fast is it growing? Well, the town's tax assessments have risen in the last four years from $3.8 million to $48 million—which gives an idea of the flood of new stores and homes it's getting.

The parking-lot program began early in 1946, when the state legislature authorized Silver Spring to issue $800,000 in bonds for building free parking lots.

Today the downtown area has eight free parking lots, covering nearly 76,000 square feet, holding nearly 2000 cars. Business has increased so much that the town recently got authority to issue another $200,000 in bonds to expand the program.

To meet the cost of the lots, a special tax was imposed on downtown property—40 cents per $100 on personal and improved real property, 20 cents on unimproved commercial and industrial land.

The taxes don't apply to business places that provide their own off-street parking spaces, so long as they meet certain county standards on size.

The bonds bear 2½ per cent interest, and will be retired by 1976. About $100,000 in special assessments has been collected to date, with $43,000 going to bond service and the rest to maintenance of the parking lots.

Land owners sold their property for the program voluntarily, with no condemnation action being necessary. The cost averaged 54 cents per square foot.

The city has erected signs directing motorists to the free parking lots, Poilce report that while more cars come downtown than ever before, traffic jams have disappeared, and accidents have declined sharply.

For in Silver Spring today, motorists don't congest the streets looking for a place to park.

—*Automobile Facts*

Evening Courses in Transportation and Traffic Engineering

Graduate Courses

T.E. 202—ADVANCED HIGHWAY DESIGN, 3 units, Mr. R. A. Moyer, M, W, 7:30-9:00 P.M., room 108, Engineering Building, Berkeley campus. Advanced study of location and design—alignment, Cross sections, intersections, interchanges, arterials.

T.E. 211—TRAFFIC ENGINEERING: OPERATIONS, 3 units, Mr. D. S. Berry, Tu, Th, 7:30-9:00 P.M., room 108, Engineering Building, Berkeley campus. Traffic regulations and restrictions, traffic control devices; traffic engineering administration.

Extension Courses

X 158 AB—FUNDAMENTALS OF TRAFFIC ENGINEERING, 2 units, Mr. R. Shoaf, W, 7:30-9:30 P.M. (first meeting March 1), room 301, 140 Montgomery Street, S. F.

Graduate instruction at Berkeley begins the week of February 13. In addition to those enrolling for graduate credit, the Institute will welcome attendance on a non-credit basis of any interested engineers.

For further information contact the Institute of Transportation and Traffic Engineering, Room 201, Building T-7, Berkeley campus. Phone: AShberry 3-6000, Ex. 805.

Los Angeles City Council Commends Dorsey

At a meeting of the Council of the City of Los Angeles, held January 5, 1950, the following resolution was adopted:

"WHEREAS this last year has been an outstanding year in the City of Los Angeles in regard to traffic safety, having an all-time 24-year record of low fatalities; and

"WHEREAS the citizens of Los Angeles appreciate the outstanding safety record of this city with the result of many lives saved and many accidents prevented; and

"WHEREAS the City of Los Angeles is very fortunate to have as its Street Traffic Engineer one of the outstanding traffic authorities in the United States and of the world, Mr. Ralph T. Dorsey, and

"WHEREAS the Traffic Engineering Commission and the Traffic Engineering Department has done outstanding work in proper design and installation of traffic safety devices which materially reduce potential traffic hazards; and

"WHEREAS the traffic court, the Police Department and the National Safety Council have contributed much to the success of this safety program;

"NOW, THEREFORE, BE IT RESOLVED that the City Council commend Mr. Ralph T. Dorsey, the Traffic Engineering Commission of the City of Los Angeles, the Los Angeles Police Department, the Traffic Court Judge, Roger A. Pfaff and the National Safety Council for their untiring efforts in making Los Angeles a safer city in which to live."

New 3M Office Building

Plans for the construction of a $3,000,000 office building by the Minnesota Mining & Manufacturing Co. were announced recently by R. P. Carlton, president.

He pointed out that the new unit will relieve congestion in the present main office building, permit consolidation of other scattered office groups and allow for future expansion.

Another part of the firm's nation-

wide expansion program is a two-story, block-long manufacturing plant now under construction here. It is scheduled for completion next fall and will cost more than $2,000,000.

"Our administration building was completed in 1940, but we have long since outgrown it," Carlton declared. "Of the 4,800 employees we have in St. Paul, nearly 1,000 work in offices, and they all need more room."

The new structure will be adjacent to the present three-level administration building.

Evansville Adopts Model Traffic Ordinance

Evansville, Indiana, widely known as the first city in the country to attempt an across-the-board aplication of the Action Program, has made sweeping revision of its traffic ordinance to bring it into conformance with the Model Traffic Ordinance. This action of the City Council followed a comparative study of the old ordinance by the Uniform Laws Division of the Foundation, which pointed to gaps and to sections at variance with the Model Ordinance.

The new ordinance establishes a traffic division in the police department, creates the office of city traffic engineer, provides for establishment of a traffic violations bureau under the city court, and creates a traffic commission, coordinating body of city department heads, city officials and civic leaders.

Putting engineering recommendations of the Action Program to work, the city has completed its first major street and traffic control improvement project, part of a long-range plan to minimize congestion and reduce accidents. One of the city's main arteries has been provided with proper signals, medial divider to separate opposing traffic, lane markers and channelization. Parking has been changed from angle to parallel.

James T. White (Assoc. Mem., ITE) was appointed City Traffic Engineer on February 1, 1949, Traffic Engineering, June, 1949, p. 460.

GETTING RESULTS

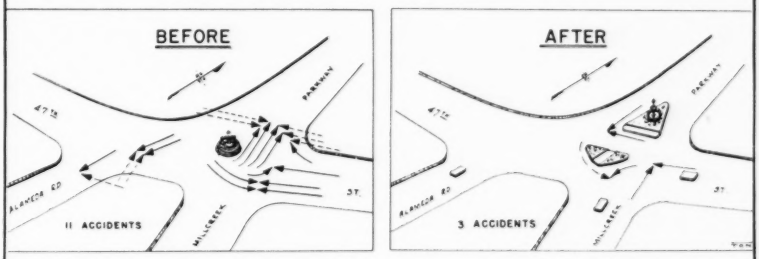
THROUGH TRAFFIC ENGINEERING

No. 7

TRAFFIC SITUATION No. 7

ISLAND REDESIGNED FOR PEDESTRIAN SAFETY

PROBLEM—The intersection of Alameda, 47th Street and Mill Creek Parkway in Kansas City, was one which presented quite a problem to the pedestrians. Five arteries intersected at this point in a large intersection in which a fountain was located in the north roadway.



ACCIDENT FACTS—Eleven accidents, of which eight involved pedestrians sustaining personal injury, and three involved motor vehicles only were experienced in a twelve month period prior to the revision. The before collision diagram illustrates the type of accidents experienced.

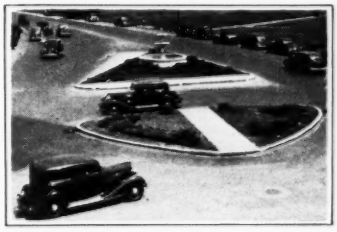
FIELD STUDIES—Traffic Volume counts indicated that approximately 50,000 vehicles moved through this intersection daily.

Pedestrian movement to and from the shopping district immediately west of this intersection amounted to about 4,000 persons daily, of which approximately one-half walked east and west in the north cross walk.

SOLUTION—The fountain was relocated at a point north of its original location on a large triangular shaped island. A sidewalk was built across the south end of this island providing for pedestrians to cross the northbound roadway with a haven of safety available before having to cross the southbound artery.

Another triangular shaped island was built to the south leaving a roadway between for west-bound vehicles, and a sidewalk was constructed across this island for north and south pedestrians. This provided for rotary type of vehicular movement with pedestrians having to cross only one-way traffic streams.

Three pedestrians islands were located in other entering arteries. These are shown in the condition and collision diagram after revision.



The total cost of this improvement amounted to approximately $3,000.00.

CHECK BACK—In a twelve month period following the improvement three accidents were experienced, one of which involved personal injury to a bicycle rider, the other two being minor vehicular collisions involving property damage only.

This amounted to a net saving of seven personal injuries in a twelve month period.

This is the fifth in a continuing series of selected "Getting Results" examples published by permission of the Accident Prevention Department, Association of Casualty & Surety Companies. Elsewhere in this issue you will note the award given to Mr. Edgar F. Copell, of Massachusetts, for the most outstanding example. The Association will welcome additional examples.

Example Contributed By
T. J. Seburn
City Traffic Engineer
Kansas City, Missouri.
Member, Institute of Traffic Engineers

Motor Scooters

A traffic problem of growing concern is the increasing use by teen-agers of motor scooters, motorized bicycles and other motor-driven cycles. These vehicles, offering speedy, economical and effortless personal transportation, appeal to the junior set as an ideal solution for bridging the gap between bicycle and car.

The National Committee on Uniform Traffic Laws and Ordinances appointed a sub-committee to make a study of the problem of motor-driven cycles and to prepare recommendations for model legislation.

Forty-three states and 192 cities furnished the sub-committee information on current practices and offered suggestions on desirable legislation. Among the facts revealed were the following:

(1) In most states motor-driven cycles come within the classification of "motorcycles" and are subject to equipment requirements for such vehicles.

(2) The states are responsible for licensing these vehicles in most instances, although 14 cities aid in licensing. (Ohio exempts motor bicycles from the law pertaining to the registration of vehicles but does not exempt the operator from the law pertaining to the licensing of drivers. A motor bicycle is defined as a vehicle principally designed to be propelled by human power to which a motor has been added.)

(3) Most municipal officials felt that licensing of vehicles and operators was

a state job but that municipalities should cooperate in the inspection of the vehicles.

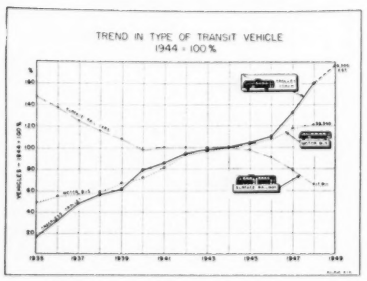
(4) Practically all persons replying stressed the need for having the same age limits for operators' licenses for these vehicles as for other types of motor vehicles.

(5) The majority favored authorizing the commissioner of motor vehicles to require that brakes and lights be of types approved by the state.

(6) The majority of state officials felt that if headlights did not conform with the requirements, authority should be granted to limit operation of the vehicles to daylight hours only.

School authorities can take definite action in the control of motor-driven cycles by working with the local police officials in carrying on an intensive educational program to inform scooter operators and their parents of the hazards of operation, of state provisions regarding equipment, licensing of operators, etc., and to urge compliance with all traffic laws and ordinances.

Most of all, youngsters should be taught to respect these machines and not to treat them as playthings. Operation by young, inexperienced riders, riding double, riding at night without lights, speeding, failing to know and obey traffic rules, and use of poorly-equipped machines can only add to the growing list of scooter accidents.



Electric trolley coaches are assuming increasing importance each year in the nation's transit systems as shown by this chart based on figures of the American Transit Association.

Although still outnumbered by the bus and streetcar, this newest mass transit vehicle has shown a much greater percentage gain in the post war period than the bus, while the streetcar has steadily lost ground in the last five years.

More and Better Guard Rails

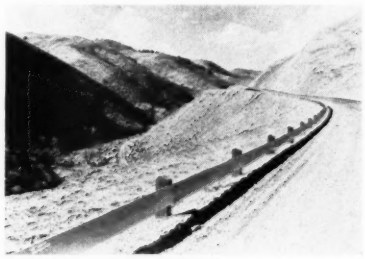
The rapid development of the automobile and motor truck has caught us unprepared for the problems of handling high speed traffic on our highways with safety. Modern automobiles are so fast and the American people have bought them in such quantities, that an appalling accident record has resulted. More deaths resulted from automobile accidents last year than resulted from all marine disasters combined for the last hundred years!

Now we are awakening to the urgent need for greater safety on our highways. Automobile designers are doing their part to promote safety by building stronger frames, steel bodies, shatter-proof glass, better brakes, and lights. Highway engineers have made much progress in highway design by building wider, smoother surfaces with broader turns and careful grading. Still there is much to be done to promote greater safety. One thing that is badly needed on many highways is more guard rail, and better guard rail. Some of the flimsy wood guard rail to be found in almost every state is a hazard that should be replaced before more people are killed by flying boards and timbers.

Let us consider, briefly, the purposes of guard rail and the requisites of efficient guard rail.

Guard rail is needed wherever cars running off the highway would upset or crash into something before brought under control. The purpose of guard rail is, first, to warn drivers of danger, and, second, to deflect out-of-control-cars back on to the highway, and prevent them from upsetting or crashing into stationary objects.

To accomplish these purposes, guard rail should have two primary qualities: first, *visibility* by day or night; second, *deflective* ability. The ability to deflect a fast moving car is far more important than ability to stop the car. A strong stone wall or a stout tree will stop the car—yes, wreck the car, and kill its occupants. That is not the function of guard rail. Other factors enter into the consideration of effective guard rail, such as appearance, ease of erection, initial cost, maintenance cost, etc., but, if the primary consideration should be *deflective* ability, then the primary purpose of guard rail is to save lives.



Let us consider various types of guard rail and, briefly, point out their advantages and disadvantages:

1. **A row of wood posts only:** Low in first cost, visibility fair, if kept painted white; deflective ability zero. If a car hits them, it either breaks through or is smashed by the posts.

2. **A row of posts with wire cable:** Low in cost, visibility fair, deflective ability almost zero even with offset fittings to hold the cable a few inches out from the posts. One advantage to be considered is that it offers little obstruction to snow removal. A couple of strong cables will usually keep a car from going over the edge of a cliff, but the car is likely to be pretty badly smashed up.

3. **A row of posts with wood horizontal railings:** A row of posts with wood horizontal railings is low in first cost, high in maintenance cost, visibility good, if kept well painted. Deflective ability, zero. The hazard from 4 x 4 or 2 x 6 timbers is great. Many a death has resulted from timbers going through a car that hits this type of guard rail.

4. **A row of posts with heavy wood horizontal timbers or logs:** Cost medium, visibility good. Sound planks of 4 x 10 size or larger make pretty fair guard rail, especially if mounted on cushioning springs of some kind that permit the timbers to yield inwardly three or four inches when struck a glancing blow. "Rustic" logs, stained brown, have poor visibility at night and not much better visibility in the daytime.

5. **Wire mesh fencing:** Low in first cost, visibility fair; deflective ability poor; strength good. This type of guard is so flexible that a vehicle

striking a glancing blow at an acute angle, deflects the mesh until the angle of impact becomes a right angle, and the tendency to deflect the vehicle becomes almost nil. Maintenance cost high. Snow removal problem serious.

6. **Steel plate guard rail:** Visibility excellent, deflective ability excellent, initial cost slightly higher, maintenance cost low.

The cost of steel plate guard rail, erected, including two coats of white or aluminum paint, should not exceed 75c per linear foot, when mounted on 6 x 8 inch square posts. Small runs of flexible strip requiring end tension, of course, cost more per foot, on account of the cost of the end pencils with coil springs and anchorage.

The tendency for higher vehicle speed is clear and can't be changed, hence it behooves highway engineers to plan for it and to do whatever they can to build with the idea of safety in mind. More and better guard rail, put up wherever needed, is tangible evidence of the fact that highway engineers are "safety minded".

H. T. MOORE, *President*
Tuthill Spring Company

Canons of Ethics For Engineers Widely Adopted

Fifty-six engineering societies in the United States and other countries have already accepted and endorsed the "Canons of Ethics for Engineers," recently drawn up by the Engineers' Council for Professional Development.

This announcement was made by Dr. D. C. Jackson, chairman of the Engineers Council's Committee on Principles of Engineering Ethics, at the Engineers Council's Annual Meeting held in Chicago.

The ethics canons, said Professor Jackson, "continue to develop as the factor of most nearly complete unity in the engineering profession." In addition to the fifty-six societies, with a combined membership of over 100,000 engineers, fifteen other engineering societies have endorsed these ethics.

The Institute of Traffic Engineers adopted a Canons of Ethics for Engineers at its Anual Meeting on October 11, 1948.

LOOKING AHEAD

March 28-31, 1950—NEW YORK CITY
Greater New York Safety Council. Annual Meeting. Executive Vice-President, Greater New York Safety Council, 60 East 42nd Street, New York City 17.

March 29-31, 1950 — STATE COLLEGE, PENNSYLVANIA
State College. First Pennsylvania Traffic Engineering Conference. Institute of Public Safety, State College, Pennsylvania.

April 26 & 27, 1950 — WASHINGTON, D. C.
Third Highway Transportation Congress. Hotel Mayflower. National Highway Users Conference, National Press Building, Washington 4, D. C.

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The MAGNO SAF-T BOARD is the result of studies by outstanding Engineers and Safety Instructors. Traffic engineers, safety directors, driving instructors, insurance agents and adjusters get a clear picture of how accidents occurred and how they can be prevented by visual demonstration.

Consisting of a board with typical street intersections on one side. The other side is a BLACKBOARD on which any street or road situation can be drawn with chalk and erased. It has scale models of vehicles, traffic markers and accessories that can be placed in any conceivable traffic situation. It can be demonstrated anywhere in a vertical position.

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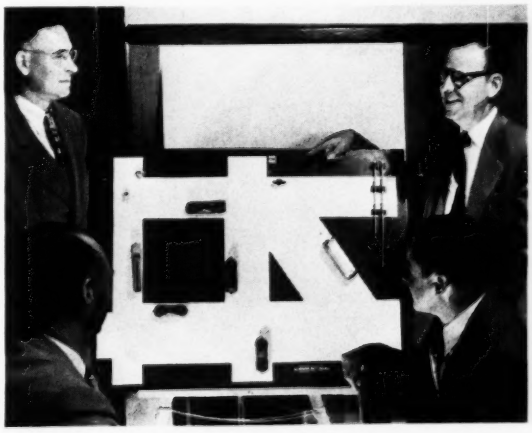

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The Michaels Art Bronze Company has designed and applied for a patent covering a pipe straightener which will not only straighten parking meter pipe standards, but will straighten any street sign post up to and including a 2½" standard pipe.

The vee block head is so designed that it can also be used for straightening inside and outside bends in angular sign posts.

Code of Manners

Donald Slutz, managing director of the Detroit Traffic Safety Association, has formulated a "Code of Manners" for women automobile passengers. The gist of it is in defiance of ordinary standards of chivalry, but, according to Slutz, "I'm sure all women would prefer a discourteous escort to a gallant corpse".

"My basic rule for women passengers," said Slutz, "is not to take offense at a male driver's disregard for the little considerations normally due her sex.

"For instance, men have been holding doors open for women for centuries. Where the automobile is concerned, that's definitely out. Generally speaking, assisting someone in or out of a car means the driver must enter or emerge in a traffic lane. A woman passenger should never permit a driver to follow her into or precede her out of a car.

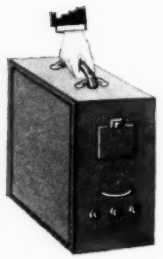
"It's also taboo for a woman to allow a male driver to light her cigarette while the car is in motion. Even with an alert driver, 80 feet is required at 30 miles an hour to brake a car to a stop. Supposing a child suddenly darted into the street? What if a bump jarred the car into the path of another automobile? It could be the most costly act of courtesy the woman ever accepted.

"A similar rule applies when a woman drops her gloves, a package or her pocketbook on the floor of the car. If she waits for the male driver to pick them up, she's a dope. A well-mannered woman will quickly retrieve them herself.

"Most codes on behavior maintain it's incorrect to point. On this, I'm in agreement. If a woman passenger sees something of interest or a friend she should discuss the matter casually. Under no circumstances should she distract her escort's attention from the wheel.

"With the increasing number of women drivers most women appreciate the necessity for concentration on driving and conduct themselves accordingly. Those who don't had better start looking for a new boy friend.

50 MILLION DRIVERS CAN BE WRONG AND NOT KNOW IT!



Psychophysical Tests for drivers can now be given anywhere *quickly* and *accurately!*

PORTO•CLINIC
the complete, portable, psychophysical driver testing unit.

The PORTO•CLINIC provides approved standard test results for Visual Acuity, Color Perception, Field of Vision, Depth Perception and Reaction Time — *at low cost.* It is a self-contained unit. Easy to operate. Built to withstand constant usage.

THE PORTO•CLINIC HAS WIDESPREAD ACCEPTANCE

The PORTO•CLINIC is today being used in the United States Army theaters of operation throughout the world for accurately measuring the physical aptitude standards required by the Department of the Army for its drivers as provided in War Department Directive AGO PRT-565. Also, by the Canadian Department of National Defence, State Education Centers, Motor Clubs, Insurance Companies, Fleet and Transit Operators and Civic Organizations interested in traffic safety.

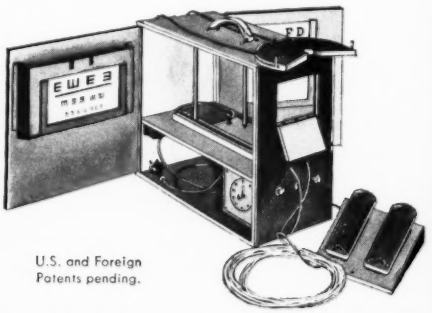
Repeat orders attest to the merit and quality of the product and to its universal need.

SPECIFICATIONS:

Dimensions — 19" high, 18" deep, 11" wide; weight, 28 lbs.

Cabinet constructed of half-inch solid walnut. All mechanical components are precision made and are built to withstand constant usage. The electric timer is especially designed and constructed for rugged use. Operates on A.C. 110 volt — 60 cycle.

The dial is graduated to record in units of 1/100th of a second, up to one second.



U.S. and Foreign Patents pending.

Address your inquiry to:

PORTO•CLINIC INSTRUMENTS, INC.

200 VARICK STREET • NEW YORK 14, N. Y., U.S.A.

Chances are the ones they have won't be around long."

Chevrolet Motor Division

MARBELITE ANNOUNCES NEW PATENTED TRAFFIC SIGNAL

√ Check the features and outstanding advantages of this new Marbelite Traffic Signal — listed on the left.

CHECK THESE ADVANTAGES

√

FIXED FOCUS SOCKET WITH ROTARY ADJUSTMENT

Prefocused and fixed for perfect focus always—
Rotary adjustment for maximum efficiency of lamp filament.

√

REFLECTORS OF SILVERED GLASS OR ALZAK

To "ITE" specifications — Exceeds "ITE" standards when used with new Marbelite Lens.

√

WIDE ANGLE LENS

New and exclusively MARBELITE for stronger light transmission over a greater range.

√

CUSHIONED OPTICAL UNIT

Mounted in the signal housing (not on door) the optical unit is completely protected by moulded gaskets against dirt, moisture, vibration and shock.

√

DIE CASTINGS FOR PERFECT FIT

Housing, door, reflector holder are die cast aluminum — fewer parts — perfect fit — assure savings in maintenance. Standard bolts join signal sections — adding sections no problem for tie rods are unnecessary.

√

MOUNTING BRACKETS FOR ASSEMBLIES

Aluminum brackets make a light assembly —a simple assembly and Marbelite mountings are available for Post, Span, Mast, Vertical and Horizontal Signals — One, Two, Three, Four and Five Way.

MARBELITE announces a new Patented Traffic Signal which is designed to give you MAXIMUM OPTICAL EFFICIENCY. This new Marbelite Signal will increase signal visiblity greatly and provide maximum optical efficiency for an indefinite time . . . a great advance and advantage in Traffic Control and Public Safety.

Cities the country over, large and small, are adopting MARBELITE Traffic Signals, Controllers, Beacons, Flashers, etc.

MARBELITE COMPANY INCORPORATED

27 WARREN STREET, NEW YORK 7, N. Y.

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Personalities . . .

THEODORE W. FORBES was born and raised in Honolulu, Hawaii, attending high school at Punahou School. He received his college education at Oberlin, majoring in mathematics, physics and sociology, receiving the A.B. in 1924. The following two years were spent in China, teaching English and coaching athletics at Oberlin in China. He returned to Oberlin (U.S.A) for an M.A. in Psychology in 1927.

After spending a year at home in

Honolulu in a sales engineering job in the mechanical specialty field, he returned to Ohio State for graduate work in Applied Psychology, obtaining the Ph.D. in 1931 with a thesis in Automobile Driver Testing. This work involved the invention of the Miniature Highway driver test which was later used as part of the Harvard Bureau for Street Traffic Research driver test battery. The Ph.D. work also involved measuring judgments of speed and distance by drivers on the highway and was part of the first large-scale psychological study of automobile driving carried on at Ohio State by the National Research Council from 1928-1931 under the direction of Weiss and Lauer.

From 1931 to 1936 Ted was in New York City as Research Psychologist at New York State Psychiatric Institute, carrying on electro-physiological research and other experimental work aimed at a better understanding of the causes of mental illness. The last three years of that period he lectured in Psychology at Columbia University.

His interest and research in the automotive field brought Ted a Fellowship to the Harvard Bureau for Street Traffic Research in the first class (1936-37) under the expanded Traffic Engineering Training program there. Upon completion of the course he became a Research Associate at the Harvard Bureau and was engaged in their driver test program under the direction of De Silva. He was in charge of statistical analysis of the driver testing results and also assisted in the supervision of the joint driver test study conducted by the Highway Research Board, the Harvard Bureau, and Dr. A. R. Lauer of Iowa State College.

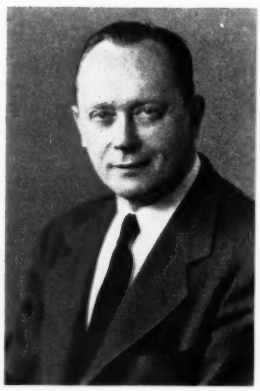
From 1938 to 1941 Dr. Forbes was Instructor and then Assistant Professor in Transportation at the Yale Bureau for Highway Traffic, teaching courses in the application of psychological measurement techniques to traffic engineering and in statistical and research methods. He also conducted laboratory and field tests on sign legibility, overtaking and passing behavior of drivers, and other studies. He was also consultant to American Transit Association on an accident analysis study of transit operators.

During the war, Dr. Forbes was on three different war research assignments conducted by universities under government contract. The first of these involved a "sound" research job at Stevens Institute of Technology. The next was under the University of Pennsylvania in the field of gunnery training research at a navy training school nead Norfolk, Virginia. After a year on this project, he went to Harvard Psycho-Acoustic Laboratory in charge of a research project on "auditory signals for instrument flying." While on this project he learned to fly in order to gain a more practical understanding of the pilot's problem.

In January of 1946 Ted went to the University of Hawaii as Associate Professor of Psychology. In the spring of 1948 he was appointed Chairman

(See FORBES, *page 253)*

HARRY H. HEMMINGS received the degree of Civil Engineer from Cornell University. After general experience in highway, aeronautical and water power engineering he became associated with the Regional Plan of New York and Its Environs. He specialized in traffic, transportation, land values, population and zoning, working closely with Ernest P. Goodrich (Mem., ITE). During 1926 and 1927 he was resident engineer of the Louisville (Ky.) Traffic Survey, working



with Ladislas Segoe (Mem., ITE) as Consultant. He returned to New York as Traffic Engineer with Robinson and Steinman, consultants, on traffic surveys for toll bridge projects.

In 1930 he was employed by the Metropolitan Life Insurance Company as safety engineer, handling traffic and public safety surveys and publications in association with W. Graham Cole (Mem., ITE). Subsequently he was transferred to the City Mortgage Division where he analyzed the relation between pedestrian traffic and land values in many cities. He is now Statistical Assistant to the Second Vice-President in charge of City Mortgages.

Harry has presented papers on highway and traffic economics, accidents, and the relation between traffic and toll rates. In 1937 he was awarded first prize in the Major Louis Livingston Seaman National Contest entitled "A Practical Safety Program to be Carried on by an Employer for the Elimination of Home Accidents."

From 1929 to 1932 he was Village Engineer, Stewart Manor, N. Y., being

engaged on maintenance of pavements and serving on the railroad grade crossing committee. In 1935 he completed a traffic survey at Geneva, N. Y., a traffic toll rate study in Pittsburgh, and investigations for the National Resources Committee.

The original series of lectures on toll bridge traffic analysis and financing, given at Polytechnic Institute in 1931, has been gradually replaced by graduate courses in traffic engineering, economics of highway engineering and traffic aspects of city planning. In March, 1948 he was appointed Adjunct Professor.

Hemmings is a charter member of the Institute of Traffic Engineers, associate member of the American Society of Civil Engineers, and a licensed professional engineer (New York). He is a former member of the publications committee (ITE), one-time Chairman, Traffic Toll Rate Committee of the American Toll Bridge Association, and former Chairman of the traffic group of the Highway Subcommittee of the Committee on Civilian Protection in Wartime (Metropolitan Section A.S.C.E.)

With their six children (five sons and one daughter) the Hemmings alternate between their apartment in Manhattan and their summer cottage on Seneca Lake where the children swim while father raises fruits and vegetables.

Secretary's Column

Your Executive Secretary had an opportunity to sit with some of the best minds in the traffic engineering research field for a special two-day meeting. The occasion was the meeting of the Department of Traffic and Operations of the Highway Research Board held in Chicago early in February. With but three exceptions the entire Department membership were on hand, in addition to several committee chairmen. Approximately two-thirds of the Department members are also members of the *Institute*.

The purpose of this meeting was to provide a first opportunity for the Department to sit down for a full two-day session, without outside interferences such as conventions to detract from attendance, and discuss past, present and future research projects for the benefit of the traffic engineering profession. All of the current research needs were carefully reviewed and classified under the following five basic functions of traffic engineering : (1) characteristics; (2) regulation; (3) control devices; (4) functional design; (5) planning and administration.

Although the traffic engineering profession has advanced considerably in the last thirty years, it was surprising to learn of the many fundamentals yet to be investigated through exhaustive and intensive research activity. The old "bug-a-boo" of traffic engineers—finances—arose when the matter of activating specific research projects was brought up but it was still possible to find ways and means of continuing research activity through the help of various governmental organizations, universities and private agencies. The *Institute* and its members, individually and collectively, can be of material assistance in sponsoring and supporting this research. Undoubtedly, many ITE members will be called upon by the Highway Research Board to act on special committees. With the support of everyone interested in the further advancement of the science of traffic engineering we feel certain that the work of the Department of Traffic and Operations will progress rapidly in the future.

* * *

It has repeatedly been brought to the attention of *Institute* Headquarters that some members of ITE are urging unqualified individuals to make application for membership. In some instances, this has proven extremely embarrassing to the Membership Committee, the Board of Direction, and the individual concerned.

We want to urge every member to carefully review the requirements for membership as detailed in Article I of the *Institute's* By-Laws. The new Yearbook, now available, includes for the first time a "Statement of Responsible Charge" adjacent to the Digest of Minimum Requirements for Admission and Transfer. With this additional information at hand there should be no need for any member to urge an individual to make application unless he is fully qualified. We are anxious to expand the membership as rapidly as possible; however, the Membership Committee and the Board of Direction have no intention of sacrificing quality for quantity.

Robert S. Holmes

SECTION NEWS

Florida Section

The Florida Section held its recent meeting on the evening of January 17, 1950.

Twenty-seven persons attended the meeting, sponsored by the Florida Section, which took place at the Administration Building of the Dade County Port Authority. In addition to our members, visitors included members of the American Society of Civil Engineers and the Illuminating Engineering Society, as well as non-members of these organizations.

The discussion entailed the extent and general trend of the Port operations, the present layout and future plans, which included the removal of present airport terminals to a central location.

The result of the meeting was very aptly summed up by Earl J. Reeder who stated that all indications from the discussion were that International Airport (Miami) will become one of the great airports of the world as to modern facilities and capacity.

WALTER D. GOTTSCHALK
Secretary

Michigan Section

The January meeting for the Michigan Section of the ITE was held in Ann Arbor, Tuesday the 17th. Professor Robert Morrison, City Planner Larry Eastman and Police Captain Barney Gainsley made the arrangements for an excellent dinner and program.

The speaker of the evening was Professor A. D. Moore of the Electrical Engineering Department at the University of Michigan who gave a highly interesting lecture on "The Art of Inventing".

President Holden LeRoy announced that the next meeting would be held in Detroit, with committees to be appointed at a later date.

A. F. Malo outlined plans for the Traffic Meeting of the Michigan State Safety Conference and asked for aid in preparing a good program for this event.

ARTHUR GIBSON
Secretary

Midwest Section

Mr. John Jenkins of the Public Relations Department of the Chicago Motor Club was speaker for the meeting of the Midwest Section held on November 10th. He discussed the several methods of presenting safety and engineering programs to the public, then told of the campaign for the trunk highway system for Illinois. Color slides illustrated the bad condition now existing on most of these highways and highlighted the safety and comfort advantages of new highway design.

The Program Committee, with Ralph Michel as chairman, came through with a fine meeting on December 15th. Harry Porter reported on the last meeting of the Institute Board of Direction, then the evening was turned over to Mr. W. H. Petersen of the Eagle Signal Corp. "Pete" demonstrated actuated signal control equipment, followed by a discussion and demonstration of new developments in school crossing signals. Opinion on the effectiveness and design of these devices is divided, to put it mildly.

The value of the recent changes in our Constitution and By-Laws to provide for "local section affiliate" members was demonstrated by the presence of 13 such potential members in addition to 17 regular members.

THOMAS A. WILEY
Secretary

The New York Board of Transportation reports that any one of its two-track subway lines can move 100,000 people an hour in one direction—equalling the capacity of 20 automobile super-highways.

New Appointments

WILLIAM C. BRANDES, having served as Traffic Engineer and Director of the Department of Traffic Control, City of Dallas, Texas, for over five years, resigned from that position early last December. On January 1st he became associated with Mr. R. E. Lynch, Jr., an agent of the Magee-Hale Park-O-Meter Co., serving the states of Texas, Louisiana, Mississippi and a portion of New Mexico. Together these gentlemen have formed the Southwest Traffic Equipment Company of Teague, Texas, for the ultimate purpose of offering a limited line of material used by municipalities and state highway departments. Mr. Brandes, by virtue of his ensuing contacts throughout the southwest, will also determine future prospects in the field of traffic engineering consultation.

Prior to his tenure of office with the City of Dallas, Mr. Brandes was, for a short time, in the Regional office of Defense Transportation in Dallas. Before that he was Traffic Signal Engineer with the City of Chicago for 12 years. He is a graduate of the State University of Iowa, receiving a B.E. degree, and is a registered professional engineer.

Kansas City bans residential truck parking for more than two hours, day or night. The only exemptions are trucks parked in front of business property during business hours, that are being loaded or unloaded.

G. DONALD KENNEDY resigned his position as Vice-President of the Automotive Safety Foundation in charge of the Highways Division on December 31, to accept a position as Consulting Engineer and Assistant to the President, Portland Cement Association.

Educated at the University of Michigan, Mr. Kennedy has a distinguished record of engineering service, both in private practice and in public life. He is a native of Michigan.

After five years as construction engineer and in consulting work with private firms, he became city engineer of Jackson, Michigan, in 1925, leaving that post two years later to become Director of Water Supply and Aeronautics at Pontiac, Michigan. He joined the Michigan State Highway Department in 1933 as business manager and consulting engineer, and after successive promotions, became State Highway Commissioner in 1940. He resigned that position to join the Foundation staff early in 1943.

Mr. Kennedy was President of the American Association of State Highway Officials in 1941. He is a member of the American Society of Civil Engineers; of the Highway Research Board, and the Institute of Traffic Engineers.

After joining the Foundation staff, Mr. Kennedy served as consultant to the Special Post-War Planning Committee of the U. S. Senate. In 1946, at the request of the California legislature, he undertook direction of a comprehensive fact-finding survey of

state, county and city highway needs. This study was followed by similar projects in Oregon, Washington, Kansas, Nebraska, Mississippi, and Ohio, in which Mr. Kennedy and his engineering staff perfected techniques for these state-wide surveys.

Automobile Production Since 1920

A review of the 12 present makes of U. S. passenger cars whose ancestors were on the road in 1920 shows that, on the average—

Their price has dropped from $2,760 for four-door models, to $1,895.

Their horsepower has risen from less than 49 to over 103.

They weigh 3,309 pounds today, or 300 more than in 1920.

Their over-all length has increased from about 14 to about 17 feet.

In terms of the average U. S. industrial wage, it takes only 34½ weeks to earn the price of today's cars, where it took 92½ weeks back in 1920.

While the over-all width of cars has increased only about five inches since 1920, seats are over a foot wider and in some cases even more, because the body has been widened into the space formerly used only by fenders.

And where the car built in 1920 had a life of about 25,000 miles, the average car built today will travel more than four times that distance before it's finally scrapped.

Even the most expensive cars of 1920—those selling at over $5,000—had less horsepower than the lowest priced cars on today's list, and lacked hundreds of refinements that are standard on today's models.

Among those items that were unknown in 1920 were the all-steel body, four-wheel hydraulic brakes, safety glass, built-in luggage compartments, windshield defrosters, synchro-mesh transmissions, coil spring suspension, automatic spark advance, automatic voltage regulator, sealed-beam headlights, and sound-proofed and weather-insulated body construction.

And so vast have been the advances in engines and gasoline that today a 100-horsepower car gets better gasoline mileage than its 1920 ancestor which had only 20 horsepower.

—*Automobile Facts*

FORBES

(Continued from page 250)

of the Department of Psychology which, with the influx of students after the war, has now grown to five full-time and ten part-time staff members. He is specializing in the courses in Industrial Psychology, Applied Psychology, Experimental Psychology and Research Seminars.

Due to the heavy teaching load, his traffic activities in Hawaii have been limited. He assisted in arranging for a course in teacher training for high school driver training courses, and was on the advisory committee to develop such a program in the schools. He prepared a chapter on "highway psychology" for a book about to be published on *Applied Psychology* and also prepared a chapter on The Driver for the revised edition of the Traffic Engineering Handbook. He has been active on several ITE committees and is President of the local psychological association in the Islands.

Ted recently accepted a one-year appointment as Visiting Associate Professor in Engineering and Psychology on the research staff of the Institute for Transportation and Traffic Engineering at the University of California, Los Angeles. He will be on leave from the University of Hawaii during this period. He hopes this arrangement will make it possible for him to attend the annual meeting of ITE in New York next September.

Aside from automotive and highway traffic research, Ted's chief hobby is flying. He devotes any available "spare time" to flying a club-owned airplane.

Positions Available

STATE ROAD DEPARTMENT OF FLORIDA
TALLAHASSEE, FLORIDA

Two vacancies exist in the Traffic and Engineering Division of the Florida State Road Department. Applications are requested from persons having had training along similar lines, preferably with a State Highway Department.

One position is for an assistant to the Divisional Head and the appointee will be expected to take over full responsibilities and duties within the next five years. The starting Salary of this assistant will be $5,400. The other position is to head the sign and signal section within the Traffic Engineering and Planning Division. The appointee for this position should have had several years experience in field procedures and office recommendations for installation of traffic sign and signals, speed and delay studies, and miscellaneous duties pertinent thereto. The starting salary for this position is $3,900.

Future prospects for both positions as to permanency and advancement appear good. All state employees in Florida are entitled to the benefits of a retirement plan. Headquarters for both positions will be at Tallahassee, Florida, and both positions will require a certain amount of field work.

Direct your inquiries to Mr. Walter M. Parker, Division Engineer, Division of Research and Records, State Road Dept. of Florida, Tallahassee, Fla.

TRAFFIC ENGINEER. Automobile Club of New York, Inc. Salary range $4,000-$4,500. It is desirable that the person have some practical engineering experience and of a kind that will enable him to work with police and community officials in discussing their specific traffic problems, making limited types of surveys, recommending practical changes that will improve the flow of vehicular and pedestrian traffic, and the parking of both passenger and commercial vehicles. In addition to being a qualified traffic engineer, it is important that personality and speaking ability be suitable for working with public officials and civic groups in conferences, and in representing the Auto Club as a speaker at meetings of various public and non-public agencies.

Direct your inquiries to Mr. Martin Klein, Director, Traffic Engineering & Safety, Automobile Club of New York, Inc., 28 East 78th Street, New York 21, N. Y.

New IRF Appointment

John P. Plum, 34, formerly on the editorial staff of the Washington Times-Herald, has been appointed Director of Information for the International Road Federation, Robert O. Swain, executive director of the federation, announced recently.

Mr. Plum, who has been on the staff of the Times-Herald since 1943, has worked on newspapers in Maryland, Texas and Michigan. He is a graduate of La Salle College, Philadelphia, and attended law school at the University of Maryland and Georgetown University.

International Road Federation headquarters are in Washington, D. C. The organization serves as a clearing house for good roads associations in 38 countries throughout the world. It is sponsored by American automobiles, petroleum, rubber and road equipment industries.

ON THE SHELF

Miss Barbara Pratt, Librarian
Yale Bureau of Highway Traffic
American Municipal Association

Parking—what cities are doing. Chicago, Ill., American Municipal Association, 1949. 17p. 50c per copy. A short survey of the parking problem in the United States, and of the various ways in which municipalities are overcoming their parking difficulties.

Burleigh, Manfred and Adams, Charles M.

Modern bus terminals and post houses. Ypsilanti, Michigan, Univ. Lithoprinters, 1941. 175p. $5.00 per copy. Plans of bus terminals of several cities which have been designed to fill the needs of traffic and environment. A second edition is planned.

Eno Foundation for Highway Traffic Control

The motor vehicle driver: his nature and improvement. Saugatuck, Conn., The Foundation, 1949. 165p. 60c per copy.

Frederick, John H.

Transportation the front line of the enterprise system. All this happened within 150 years. Chicago, Ill., Transportation Association of America, 1949. 20p. 50c per copy.

Highway Research Board

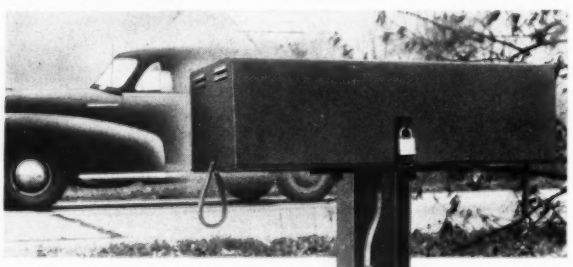
Bulletin number 17. *Highway Planning.* Washington, D. C., The Board, 1948. 42p. 60c per copy. Bulletin number 17 contains six papers presented at the 27th Annual Meeting of the Highway Research Board, as a symposium on, "Uses of Highway Planning Survey Data."

Highway Research Board

Bulletin number 18. *Land Acquisition and Control of Highway Access and Adjacent Areas.* Washington, D. C., The Board, 1949. 40p. 60c per copy.

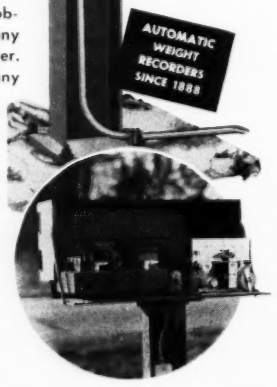
Public Roads Administration

Highway practice in the United States. Washington, D. C., U. S. Government Printing Office, 1949. 230p. 45c per copy.



NEW PERMANENT STATION TRAFICOUNTER

Below: Counter Open



Here is the improved Permanent Station Traficounter — the latest in the line of Traficounters Streeter-Amet has developed over a period of many years. All highway departments who have relied on Streeter-Amet for help in their traffic problems will appreciate the many advantages of this new Traficounter. The detection is not affected by any weather — snow or ice. It is designed especially to eliminate rubber tubes or treadles. It detects vehicles at high or low density of traffic.

Write for information regarding this permanent Station Traficounter

Streeter-Amet Company
1726 BELLE PLAINE AVENUE
CHICAGO 13, ILLINOIS

ARMOR-FLEX TRAFFIC MARKERS

A DURABLE PLASTIC REPLACING PAINT ON PAVEMENTS

1. Widely used by leading cities for over 14 years.
2. Its use cuts marking costs by over 50 per cent.
3. Very high reflection and visibility.
4. Easy to apply. We train your own crews.
5. Installed with no interference with traffic.
6. Ideal for new and resurfaced pavements.
7. Available in desired sizes and colors.

NEW — An Industrial Marker — perfect for marking off-street parking lots and garages.

Let us supply you with full information.

ARMOR-FLEX COMPANY
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ELECTRO-MATIC
PRESSURE-SENSITIVE VEHICLE DETECTORS

Electro-Matic PRESSURE-SENSITIVE VEHICLE DETECTORS are designed for trouble-free and lasting service. Heavy Steel Frame gives maximum strength and security of anchorage. Contact Unit is removable and electrical connections are easily made. These detectors are highly resistant to traffic wear and the elements. Type HR non-directional detectors are available as 4, 6, or 8 foot lengths.

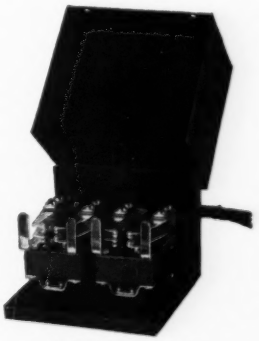
★ **Traffic-Actuated Control Systems**

★ **Toll Stations**

★ **Highway Traffic Counting**

★ **Automatic Door Openers**

★ **Wherever reliable Vehicle Detectors are required**



DR5 Relay Unit

For DIRECTIONAL DETECTING—Type HRD Directional Detectors use the same frame, with a Contact Unit of different interior construction. DR5 Relay is used with the HRD unit to secure directional operation. HRD Detectors available in 6 and 8 foot sizes.

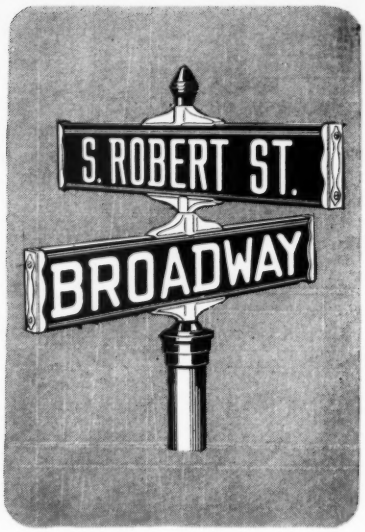
Send for Automatic Signal's Bulletin No. 466

Automatic Signal Division
EASTERN INDUSTRIES INCORPORATED

TRAFFIC ACTUATED

NORWALK, CONNECTICUT

Your streets have names... identify them proudly



MODERN STREET NAME SIGNS by LYLE

●The identification of streets and boulevards, with beautiful, legible signs, is an essential civic improvement. Street name signs dress up a town . . . they're the finishing touches of good grooming and quiet self-respect.

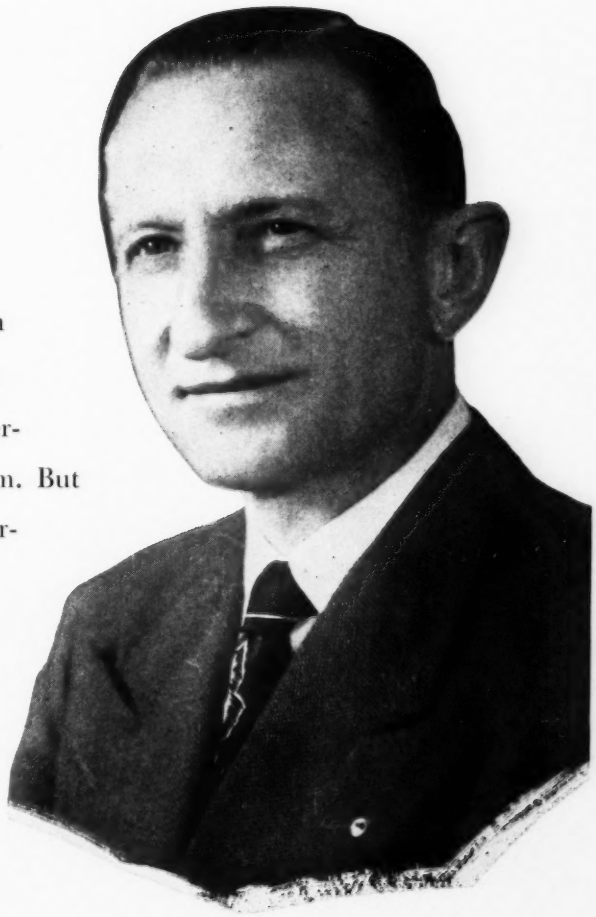
For over 35 years Lyle has been serving American communities with street name signs . . . and we emphasize these years of service because, once a community has selected a design style, it wants assurance that its sign supplier will be in business years hence to furnish the same type and style of sign to identify community expansion or the changing of street names.

Lyle offers two types of signs . . . Lyle Deep-Embossed and Lyle Carved-in-Metal letters . . . plus a complete line of posts, brackets and accessories. Write today for special street sign catalog . . . or, if you'd like to examine a sample of any Lyle signs illustrated, we'll be glad to send it . . . without cost or obligation, of course.

LYLE SIGNS, INC.
2720 University Ave. S.E.
MINNEAPOLIS, MINNESOTA

"You can't put all the blame on drivers when Street Lights are outmoded"

says **Herbert B. Woodling,**
Safety Engineer
Akron, Ohio



"TRAFFIC engineers can best approach traffic problems by first understanding the man-behind-the-wheel. Frequently, driver-education is the only solution to the problem. But when it comes to *night* traffic problems, driver-education and efficient traffic operation are made ineffective if the streets are not properly lighted. In Akron, progress in street lighting goes with progress in traffic engineering."

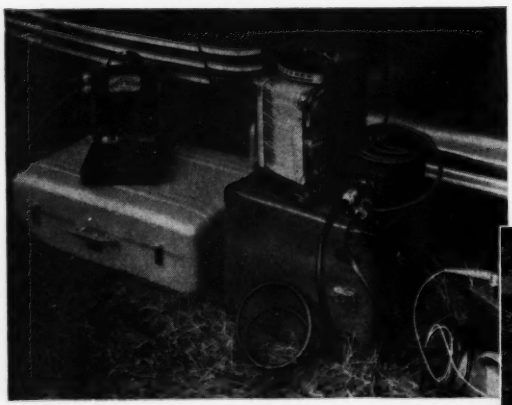
The Street and Traffic Safety Lighting Bureau, 155 East 44th St., New York 17, N. Y.

ELECTRO-MATIC
Speed Meter

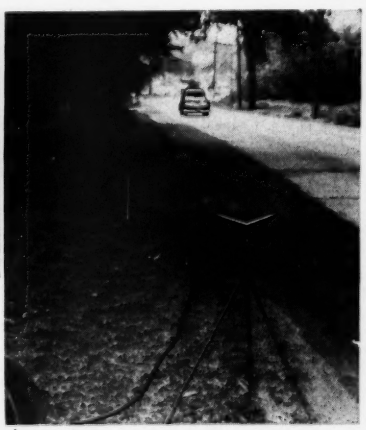
Model S-1 Electro-Matic *Speed Meter* measures the speed of moving vehicles from 0 to 100 m.p.h. This precision instrument operates with radio-frequency microwaves and is accurate within 2 m.p.h. A *Graphic Recorder* is connected in circuit with the *Speed Meter* when a permanent speed reading record is desired.

The instrument is quickly set up and connected, ready for operation after a minute or so for heating tubes. Under average conditions operating zone is about 150 ft. in advance of Antenna Unit. Continuous speed measurement is made of vehicles moving within the direct microwave radiation path.

For operating convenience, the *Speed Meter* is in 3 parts: Antenna Unit, Indicator Unit, Power Unit. The Antenna Unit is beamed at oncoming or receding traffic and may be located in a parked car or set up near the roadway. At the convenience of the operator the Indicator Unit and the Power Unit may be placed within or without the car. An aluminum carrying case is provided to contain the 3 units and connecting cables—total weight about 45 lbs.



The *Speed Meter* operates from a 6 volt automobile battery (8 amp drain) or from a 120 volt 50-60 cycle AC supply (50 watt rating). The *Graphic Recorder* is spring wound, has a capacity of 100 ft. of tape and operates at a speed of 1½ inches per minute.



★ **Microwave Accuracy**

★ **Car Battery Operation**

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